

Baltimore County County Council Annual Stormwater Remediation Report For the Year Ended June 30, 2014

Pursuant to County Council Bill 20-13, the Administration is providing the requested information.

1. The most recent information reported the State regarding the effects of the programs activities on reducing pollution is summarized in the Baltimore County National Pollution Discharge Elimination System (NPDES) – Municipal Stormwater Discharge Permit 2013 Annual Report, Section 9: TMDL Restoration. Section 9 attached as Appendix I.

2. The number of credits toward the fee and their associated dollar amounts are summarized as follows:

Account Category	Number of Accounts Receiving BMP Credits	Total BMP Credits (square feet of Impervious Surface Area)	Total BMP credits (dollars)
Commercial	3,597	73,078,746	\$2,521,216.74
Institutional	355	8,8146,328	\$81,463.28
Total	3,952	81,225,074	\$2,602,680.02

3. The number of appeals filed, the nature of the appeal and the disposition of the appeals are shown in the following table.

Grounds for Appeal										
1. Incorrect Classification	2. Error in Calculation	3. Error in Property Owner	4. Other Pollutant Reduction Practices	5. Clean Marina Credit Request	No Grounds Indicated	# of Accounts Appealed	# of Accounts Denied	# of Accounts Accepted	Change in Fee as a Result of Accepted Appeals	
X						53	26	27	-\$16,710.44	
X	X					28	9	19	-\$33,127.52	
X	X	X				2	0	2	-\$839.73	
X	X	X	X			4	3	1	-\$750.39	
X	X	X	X	X		4	4	0	\$0.00	
X	X		X			17	17	0	\$0.00	
X	X		X	X		9	8	1	-\$758.90	
X	X			X		1	1	0	\$0.00	
X		X				2	2	0	\$0.00	
X			X			5	2	3	-\$5,126.46	
X				X		2	0	2	-\$3,114.81	
	X					399	297	102	-\$132,555.83	
	X	X				35	30	5	-\$4,628.25	
	X	X	X			2	1	1	-\$219.78	
	X		X			146	48	98	-\$58,460.71	
	X			X		11	4	7	-\$3,347.34	
		X				3	1	2	-\$1,952.64	
			X			42	24	18	-\$13,172.77	
					X	5	5	0	\$0.00	
TOTALS						770	482	288	-\$274,765.57	

4. The number of hardship applications filed by property class and disposition is as follows:

Approved:

Detached Homes (\$39.00) – 34

Condominiums (\$32.00) – 9

Townhouses (\$21.00) – 4

Total Approved – 47

Denied:

Not Owner Occupied - 1

Late Applications – 3

Total Denied – 4

5. The number of applications filed to reduce any portion of a fee by property class and disposition of each. See 3 above.
6. The amount of funds spent on each of the purposes permitted by councilmanic district and type of project. See Appendix II - Baltimore County Office of Budget and Finance Stormwater Report, Section V.
7. Program costs and revenues by source. See Appendix II – Baltimore County Office of Budget and Finance Stormwater Report Sections II, III, & IV.
8. Results of the County monitoring and verification efforts are shown in the following table:

Month	As Built Public	As Built Private	1-yr. Public	1-yr. Private	3-yr. Public	3-yr. Private	Total Facilities on 3-yrs Inspection	Target Number of 3-yr.
July 2013	3	3	3	3	7	53	1303	36
August 2013	1	4	11	16	4	58	1303	36
Sept. 2013	4	2	3	4	2	54	1303	36
Oct. 2013	6	7	9	13	4	68	1303	36
Nov. 2013	8	1	1	6	1	57	1303	36
Dec. 2013	4	6	0	4	1	76	1303	36
Jan. 2014	4	2	7	4	20	105	1303	36
Feb. 2014	0	0	8	5	2	46	1303	36
March 2014	0	0	2	9	7	119	1303	36

April 2014	1	7	5	10	3	124	1303	36
May 2104	4	3	7	11	1	95	1303	36
June 2014	0	2	8	1	0	40	1303	36

Note: The number of monthly inspections for facilities on the 3-yr cycle exceeds the monthly target needed to meet the established goal because it includes not only initial inspections needed for the month, but also follow up inspections on facilities that were previously cited with a deficiency that needed to be corrected.

Additional program results are detailed in Section 9: TMDL Restoration of the County's National Pollution Discharge Elimination System – Municipal Stormwater Discharge Permit 2013 Annual Report (attached as Appendix I).

9. Programs for encouraging homeowners and other property owners to adopt best practices for stormwater management including plans to implement grant or loan programs are as follows:
 - a. Small Watershed Action Plans (SWAPs): Identify citizen-based actions, provides the actions that can be taken in various neighborhoods.
 - Rooftop disconnects
 - Urban tree canopy planting
 - Conservation landscaping
 - Targeted education and outreach for reduction in fertilizer use
 - b. Watershed Planning and Implementation Grants
 - Annual grants to six local watershed associations
 - Use of information and actions from SWAPs to engage citizens in restoration actions and conduct education and outreach efforts.
 - c. Rain Barrel Sale
 - d. Big Tree Sale
 - e. Promote Tree-mendous Program and deliver trees
 - f. Rural Residential Stewardship Program
 - g. Nonprofit grants for impervious surface removal
 - h. Source reduction for trash through education and outreach for various sectors will be highlighted in the Trash Reduction Strategy currently under development.
 - i. Assist the County Executive in the Clean Green 15 Program.
 - j. Provide information to the public and technical professionals on the EPS website.
 - k. Publish a quarterly electronic newsletter.
 - l. Attend public meetings of community associations, business and trade organizations, environmental organization and professional organizations to inform them of updates and requirements for environmental compliance and stewardship.

Appendix I

Baltimore County National Pollution Discharge Elimination System - Municipal Stormwater Discharge Permit 2013 Annual Report Section 9: TMDL Restoration

(link to entire report at: [2013 NPDES Annual Report](#))

9.0 Permit Requirements

Existing Permit Conditions

F. Watershed Assessment and Planning

Baltimore County shall continue to update and revise watershed assessments that have been developed for its 10 urban watersheds (Baltimore Harbor, Bird River, Back River, Gwynns Falls, Jones Falls, Little Gunpowder, Loch Raven, Lower Gunpowder River, Middle River, and the Patapsco River). The overall goal is to ensure that each County watershed is thoroughly evaluated and has an action plan to maximize water quality improvements. Additionally, the County shall encourage the public to participate in the development and implementation of watershed restoration activities. At a minimum, the County shall:

1. Continue to perform and update detailed assessments in all of its urban watersheds. These watershed assessments shall include:
 - a. Determining current water quality conditions;
 - b. Identifying and ranking water quality problems;
 - c. Identifying all structural and non-structural water quality improvement opportunities;
 - d. Reporting the results of a visual watershed inspection;
 - e. Specifying how the restoration efforts will be monitored; and
 - f. Providing an estimated cost and a detailed implementation schedule for those improvement opportunities identified above.
2. By 6/15/2006, the County shall complete the prioritization process for selecting subwatersheds for restoration started during the previous permit term. These subwatersheds shall contain at least 20% of the County's impervious cover. Restoration efforts resulting from this prioritization process shall be in addition to typical stormwater management facility maintenance; and
3. By the end of this permit term, the County shall propose for restoration subwatersheds containing another 10% of the County's impervious surface area with poor or no stormwater management. These sub-watersheds shall be in addition to the 20% already proposed for restoration under the requirements above.

G. Watershed Restoration

The County shall implement those practices identified in Part III. F. above to control stormwater discharges to the maximum extent practicable. The overall goal is to maximize the water quality in the County's urban watersheds, using efforts that are definable and the effects of which are measurable. At a minimum, the County shall:

1. Complete the implementation of those restoration efforts that were identified and initiated during the previous permit term to restore 10% of the County's impervious surface area.

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2. Within one year of permit issuance, begin to implement restoration of an additional 10% of the County's impervious surface area. .
3. Annually, Baltimore County shall update its impervious surface restoration accounting sheets for each of its urban watersheds. At a minimum, these data shall include:
 - a. Total impervious acres for each urban watershed;
 - b. A schedule and cost estimate for the design, construction, and completion for each retrofit project;
 - c. The impervious acres controlled or restored within each watershed; and
 - d. The monitoring data and surrogate parameter analyses used to determine water quality improvements.

J. Total Maximum Daily Loads

Stormwater BMPs and programs implemented as a result of this permit must be consistent with available waste load allocations (WLA's)[see 40 CFR122.44(d)(1)(vii)(B)] developed under a Total Maximum Daily Load (TMDL). MDE has determined that owners of storm drain systems that implement the requirements of this permit will be controlling stormwater pollution to the maximum extent practicable. Therefore, satisfying the conditions of the permit will meet WLA's specified in TMDL's developed for impaired water bodies. If assessment of the stormwater management program indicates TMDL WLAs are not being met, additional or alternative stormwater controls must be implemented to achieve WLAs.

Draft Permit Conditions**E. Total Maximum Daily Loads**

Section 402(p)(3)(B)(iii) of the Clean Water Act (CWA) states that municipal storm sewer permits must require stormwater controls to reduce the discharge of pollutants to the MEP. By regulation at 40 CFR §122.44, EPA further requires that BMPs and programs implemented pursuant to this permit must be consistent with applicable waste load allocations (WLAs) developed under EPA approved TMDLs (see list of impaired waters attached and incorporated as Attachment B). The goals of Maryland's NPDES municipal stormwater permit program are to control stormwater pollutant discharges by implementing the BMPs and programs required by this permit, show progress toward meeting WLAs, and contribute to the attainment of water quality standards according to the CWA

In pursuit of these goals, Baltimore County shall annually provide watershed assessments, restoration plans, opportunities for public participation, and TMDL compliance status. A systematic assessment shall be conducted and a detailed restoration plan developed for all watersheds within Baltimore County. As required below, watershed assessments and restoration plans shall include a thorough water quality analysis, identification of water quality improvement opportunities, and a schedule for BMP and programmatic implementation to meet stormwater WLAs included in EPA approved TMDLs.

1. Watershed Assessments

- a. By the end of the permit term, Baltimore County shall complete detailed

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watershed assessments for the entire County. Watershed assessments conducted during previous permit cycles may be used to comply with this requirement, provided the assessments include all the items listed in Part III.E.1.b. below. Assessments shall be performed at an appropriate watershed scale (e.g., Maryland’s hierarchical eight or twelve-digit sub-basins) and be based on MDEs TMDL analysis or an equivalent and comparable County water quality analysis;

- b. Watershed assessments by the County shall:
 - i. Determine current water quality conditions;
 - ii. Include the results of a visual watershed inspection;
 - iii. Identify and rank water quality problems;
 - iv. Prioritize all structural and nonstructural water quality improvement projects; and
 - v. Specify pollutant load reduction benchmarks and deadlines that demonstrate progress toward meeting all applicable stormwater WLAs.

2. Restoration Plans

- a. Within one year of permit issuance, Baltimore County shall submit an impervious surface assessment consistent with the methods described the MDE document “Accounting for Stormwater Wasteload Allocations and Impervious Area Treated, Guidance for National Pollutant Discharge Elimination System Stormwater Permits (MDE 2011 or subsequent versions). Upon approval by MDE, this impervious surface area assessment shall serve as the baseline for the restoration efforts required in this permit.
- b. By the end of the permit term, Baltimore County shall commence and complete the implementation of restoration efforts for twenty percent of the County’s impervious surface area consistent with the methodology described in the MDE document cited in paragraph a. that is not already restored to the MEP;
- c. Within one year of permit issuance, Baltimore County shall submit to MDE a restoration plan for each stormwater WLA approved by EPA prior to the effective date of the permit. The County shall submit restoration plans for subsequent TMDL WLAs within one year of EPA approval. Upon approval by MDE, these restoration plans will be enforceable under this permit. As part of the restoration plans, Baltimore County shall:
 - i. Include a detailed schedule for implementing all stormwater structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives necessary for meeting applicable stormwater WLAs;
 - ii. Provide detailed cost estimates for individual projects, programs, controls, and plan implementation;
 - iii. Evaluate and track implementation of watershed restoration plans

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through monitoring or modeling to document progress toward meeting established benchmarks, deadlines, and stormwater WLAs; and

- iv. Develop an ongoing, iterative process that continuously implements structural and nonstructural restoration projects, stormwater program enhancements, and alternative BMPs where EPA approved TMDL WLAs are not being met according to the benchmarks and deadlines established as part of the County's watershed assessments.

3. Public Participation

Baltimore County shall provide continual outreach to the public regarding the development of its watershed assessments and restoration plans. Additionally, the County shall allow for public participation in the TMDL process, solicit input, and incorporate any relevant ideas and program improvements that can aid in achieving TMDLs and water quality standards. Baltimore County shall provide:

- a. Notice in a local newspaper and the County's web site outlining how the public may obtain information on the development of the watershed assessments and watershed restoration plans and opportunities for comment;
- b. Procedures for providing watershed assessments and watershed restoration plans to interested parties upon request;
- c. A minimum 30 day comment period before finalizing watershed assessments and watershed restoration plans; and
- d. A summary in each annual report of how the County addressed or will address any material comment received from the public.

4. TMDL Compliance

Baltimore County shall evaluate and document progress toward meeting all applicable WLAs included in EPA approved TMDLs. An annual TMDL assessment report with tables shall be submitted to MDE. This assessment shall include complete descriptions of the analytical methodology used to evaluate the effectiveness of the County's stormwater restoration plans and how these plans are working to achieve compliance with EPA approved TMDLs. Baltimore County shall provide:

- a. Estimated net change in pollutant load reductions from all completed structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives;
- b. A comparison of the net change in pollutant load reductions detailed above with the established benchmarks, deadlines, and applicable stormwater WLAs;
- c. Itemized costs for completed projects, programs, and initiatives to meet

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established pollutant reduction benchmarks and deadlines;

- d. Cost estimates for completing all project, programs, and alternatives necessary for meeting applicable WLAs; and
- e. A description of a plan for implementing additional watershed restoration actions that can be enforced when benchmarks, deadlines, and applicable stormwater WLAs are not being met or when projected funding is inadequate.

9.1 Introduction

This section covers watershed management planning activities and status of TMDL development (9.2), pollution load reduction calculations (9.3), restoration progress (9.4), and progress in meeting the impervious cover restoration targets (9.5) and TMDL reduction allocations (9.6).

Section 9.2 discusses the development of Small Watershed Action Plans and in the future will discuss not only the status of TMDL development but also the development of TMDL Implementation Plans. These plans meet the requirements for development of watershed assessment and restoration plans. The plans are intended to provide the road map for meeting TMDL reduction requirements, protecting our Tier II waters, and meeting locally developed water quality goals.

Section 9.3 clearly lays out the process used in determining the pollutant load reduction attributable to the various types of restoration conducted to meet water quality objectives. The information for the calculations is derived from the latest Chesapeake Bay Program spreadsheet on BMP efficiencies, CBP expert panel reports on various BMP practices (as they are available), and the draft document entitled *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* (MDE June, 2011).

Section 9.4 details the restoration progress made to date due to capital program restoration projects, community reforestation program efforts, and restoration efforts by the various local watershed associations. The information is presented by program and by watershed.

Section 9.5 details progress made in meeting the impervious cover treatment acres required as a tracking mechanism in the stormwater permit. An impervious cover analysis has been conducted to determine the amount of impervious cover in 2002 (the base year) in Baltimore County. The current target is 20% of the impervious cover in Baltimore County. With the issuance of the next NPDES – MS4 permit the impervious cover target is anticipated to increase to 40%. Section 9.6 details progress made in meeting the local TMDL reduction allocations and the Chesapeake Bay TMDL for the reduction of nutrients and sediment.

9.2 Status of Watershed Management Plans**9.2.1 Small Watershed Action Plans (SWAPs)**

Water quality management plans have been completed for ten of the fourteen major watersheds in Baltimore County. The four remaining watersheds have limited urban development and therefore are not required by the NPDES – Municipal Stormwater Discharge Permit to have water quality management plans. However, recognizing the benefits of a watershed management plan, Baltimore County has completed the development of a Prettyboy Watershed Plan under the State's Watershed Restoration Action Strategy (WRAS) process. Harford County in conjunction

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with stakeholders has also completed the WRAS process to develop a watershed plan for Deer Creek watershed.

In 2005, Baltimore County initiated a new round of watershed planning, entitled Small Watershed Action Plans (SWAPs). The SWAP planning process is meant to bring together the many mandates that the County is charged to meet in each individual watershed, including the requirements of the NPDES – Municipal Stormwater Discharge Permit, Total Maximum Daily Loads (TMDLs), goals in the Chesapeake 2000 and the Tributary Strategies, the Reservoir Management Program and the Baltimore Watershed Agreement. The Chesapeake Bay TMDL is being addressed in SWAPs currently under development and will be addressed in future SWAPs. For those SWAPs already completed, an addendum will be developed over the next year modifying the SWAP actions to meet the Chesapeake Bay TMDL. The small watershed action planning process is designed to bring all these individual mandates together at a subwatershed level that will help residents understand the intent of each program, how to most efficiently meet the goals, and define the roles of the partners. The SWAPs will build on the previously completed technical Water Quality Management Plans.

Stakeholders are invited to participate in the development of each SWAP. A series of two to three meetings are held over the course of the development of each SWAP. The first introduces the stakeholders to the process and solicits their input on the characterization of the planning area and goals. The second meeting presents the final characterization document and solicits input on preferred restoration options. The third meeting presents the SWAP, which includes not only County actions and projects, but also citizen based and business based restoration activities and options. Planning areas were selected on similarity of impacts within each area, allowing focus on specific issues related to the stakeholders that live and work within each planning area. Twenty-three planning areas have been delineated. Once the re-issued NPDES – MS4 permit is in place the newly completed SWAPs will be posted for a 30-day comment period prior to finalization.

When the SWAPs have been completed the Steering Committee becomes the Implementation Committee, which will meet twice each year to determine progress being made, barriers to making progress, and the need for any revisions.

Since the last NPDES Annual Report the following SWAPs have been completed:

- Northeastern Jones Falls SWAP – November 2012
- Bear Creek/Old Road Bay SWAP – November 2012

Previously completed SWAPs include:

- Prettyboy WRAS – January 2008
- Spring Branch SWAP – March 2008 (smaller subshed specifically developed for 319 grant funding, will be included in the larger Area O SWAP)
- Lower Jones Falls SWAP – October 2008
- Upper Back River SWAP – November 2008
- Tidal Back River SWAP – February 2010
- Upper Gwynns Falls SWAP – May 2011
- The Beaver Dam Run, Baisman Run, and Oregon Branch SWAP - November 2011
- The Middle River and Tidal Gunpowder SWAP - February 2012
- The Lower Patapsco SWAP - May 2012

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An additional four SWAPs are currently under development with an expected completion date in the fall of 2013, except Area O where the expected completion date is spring 2014:

- Middle Gwynns Falls SWAP (Area C)
- Northeastern Loch Raven Reservoir SWAP (Area R)
- Bird River SWAP (Area K)
- Southeastern Loch Raven Reservoir SWAP (Area O)

Scope of Work and Cost Proposals have been solicited from our contractors for the development of three additional SWAPs with a completion date in the fall of 2014. These include:

- Northern Loch Raven Reservoir SWAP (Area X)
- Urban Lower Gunpowder SWAP (Area N)
- Rural Jones Falls SWAP (Area G)

Figure 9-1 shows the planning areas and schedule, while Table 9-1 shows the status, schedule, and the acres for each planning area. The completed SWAPs are posted on the County web site:

<http://www.baltimorecountymd.gov/Agencies/environment/watersheds/swap.html>

Table 9-1 SWAP Schedule

Watershed	SWAP Area	Acres	Completed By:	Anticipated Completion
Patapsco	A	17,569	Consultant	Complete
Patapsco	B	15,761	Consultant	2014
Gwynns Falls	C	14,884	Consultant	Underway - 2013
Balt Harbor	D	11,484	Consultant	Complete
Back River	E	7,858	Consultant	Complete
Gunpowder/Middle R.	F	6,520	Consultant	Complete
Jones Falls	G	13,187	Consultant	Initiate – Fall 2013 – Complete 2014
Jones Falls	H	5,777	EPS/Consultant	Complete
Loch Raven	I	8,350	Consultant	Complete
Bird River	K	22,528	Consultant	Underway - 2013
Back River	L	15,385	EPS	Complete
Jones Falls	M	6,957	EPS	Complete
Lower Gunpowder	N	10,553	Consultant	Initiate – Fall 2013 – Complete 2014
Loch Raven	O	17,523	EPS	Underway - 2014
Little Gunpowder	P	17,217	Consultant	2014
Lower Gunpowder	Q	18,931	Consultant	2014
Loch Raven	R	11,466	Consultant	Underway - 2013
Liberty Reservoir	S	16,449	Consultant	2015
Prettyboy Reservoir	T	24,027	EPS	Complete
Deer Creek	U	7,132	Harford County	Complete
Gwynns Falls	V	13,618	Consultant	Complete
Loch Raven	W	38,515	Consultant	2015
Loch Raven	X	61,436	Consultant	Initiate – Fall 2013 – Complete 2014

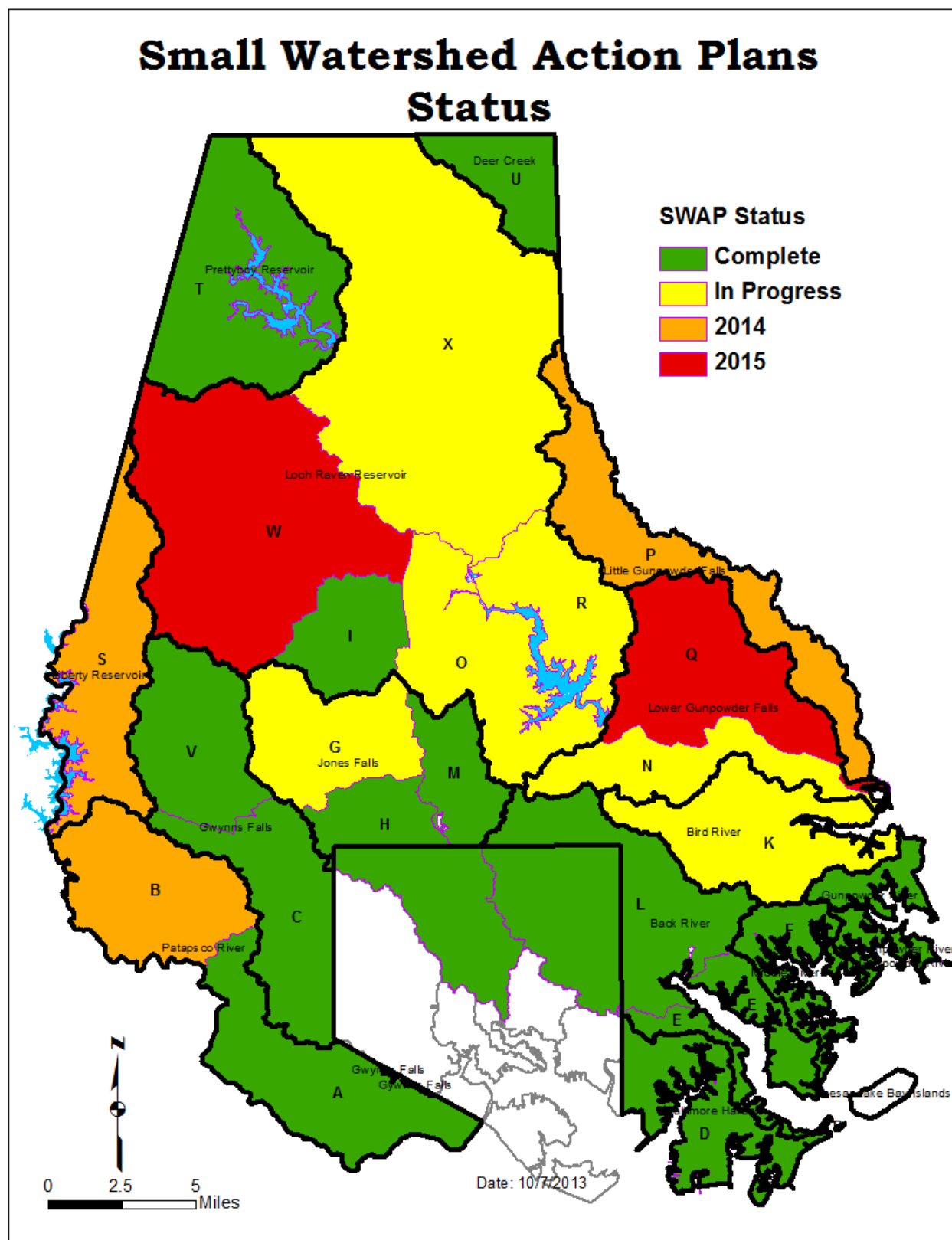


Figure 9-1: Baltimore County SWAP Status

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9.2.2 Total Maximum Daily Load (TMDL) Implementation Plans

The next generation of the NPDES – MS4 permit will require the preparation of TMDL Implementation Plans when renewed. All previously approved TMDLs must have a TMDL Implementation Plan prepared within one year of permit renewal. For those TMDLs approved during the term of the permit, the TMDL Implementation Plan must be developed within one year of EPA approval of the TMDL.

TMDLs are developed by the State for waters listed as impaired on the 305(d) list. The 305(d) list is updated during the course of the development of the Integrated Report. The Integrated Report is required by federal law to be submitted to EPA every two years. The Integrated Report and further information on the Report can be found on the MDE web page:

<http://www.mde.maryland.gov/programs/Water/TMDL/Integrated303dReports/Pages/Programs/WaterPrograms/TMDL/Maryland%20303%20dlist/index.aspx> The most recent Integrated Report was developed in 2012; that report has yet to be approved by EPA – Region 3. Table 9-2 presents the status of TMDL development for watersheds within Baltimore County and impairment status as reported in the 2012 Integrated Report. Those waters listed as impaired will have a TMDL developed in future years. For review of the TMDLs, see MDE webpage: <http://www.mde.maryland.gov/programs/Water/TMDL/CurrentStatus/Pages/Programs/WaterPrograms/TMDL/Summittals/index.aspx> The TMDLs and the Water Quality Assessments (WQAs) are listed by watershed with links to the TMDL or WQA document and supporting information. Water Quality Assessments are performed when there is limited data for the impairing substance. It is often found that the substance is not causing an impairment in the water body, so the impairment listing will be removed in the next Integrated Report. A number of assessment methodologies have been developed for determining impairments (see - http://www.mde.state.md.us/programs/Water/TMDL/Integrated303dReports/Pages/Programs/WaterPrograms/TMDL/maryland%20303%20dlist/ir_listing_methodologies.aspx). For aquatic biological community impairments, the impairment listing is removed once the cause of the impairment is determined and the waterbodies are listed for the impairing substances. For streams the assessment methodology *Maryland Biological Stressor Identification Process* (http://www.mde.state.md.us/programs/Water/TMDL/ApprovedFinalTMDLs/Documents/www.mde.state.md.us/assets/document/BSID_Methodology_Final.pdf).

The impairment listings can be based on water body type, typically they are listed based on streams, impoundments (reservoirs) or tidal water receiving waters. When a TMDL is developed for a particular pollutant, the watersheds draining to the waterbody may be determined to contribute the pollutant to the receiving water and require reduction of that pollutant in the watershed. For example, the Middle Branch and the Northwest Harbor portions of Baltimore Harbor are listed as impaired by trash. The trash in these two portions of Baltimore Harbor comes only partially by direct deposition within the tidal waters, the balance comes from the two watersheds that drain to this portion of the harbor, therefore, when the TMDL is developed, trash reductions will have to be made in Gwynns Falls, and Jones Falls which drain to the harbor and supply trash to the harbor. Similarly, the reasons for the impairment will vary depending on which water quality standard is being impacted. This will be discussed more fully for each type of impairment, below table 9-2.

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Table 9-2: TMDL, WQA, and Impairment Listing Status by Watershed and Tidal Segment

Watershed	Nutrients	Sediment	Bacteria	Toxics Organics	Toxics Metals	Other
Deer Creek	Not Impaired	Not Impaired	Not Impaired	Not Impaired	Not Impaired	Not Impaired
Prettyboy Reservoir Streams	Not Impaired	Not Impaired	TMDL - 2009	Not Impaired	WQA - 2003	Not Impaired
Prettyboy Reservoir Impoundment	Phosphorus TMDL – 2008	Not Impaired	Not Impaired	Impaired – PCBs -	TMDL - Hg in fish tissue – 2006 WQA – Zn, Ni, Pb, Cu, Cr, Cd, AS - 2006	Not Impaired
Loch Raven Reservoir Streams	Not Impaired	Not Impaired	TMDL - 2009	Not Impaired	WQA- 2003	Biological Community
Loch Raven Reservoir Impoundment	Phosphorus TMDL – 2008	TMDL – 2008	Not Impaired	Impaired – PCBs	TMDL - Hg in fish tissue – 2006 WQA – Ni, Pb, Cu, Cr, Cd, As - 2004	Not Impaired
Lower Gunpowder	Impaired - Phosphorus	Impaired	Not Impaired	Not Impaired	WQA – As, Hg, Zn, Ni, Pb, Cr, Cd - 2004	Impaired – Sulfates, Chlorides Impaired – Stream Alteration
Little Gunpowder	WQA - 2009	Not Impaired	Not Impaired	Not Impaired	WQA – Hg – 2004 WQA – Zn, Ni, Pb, Cu, Cr, Cd, As - 2004	Not Impaired
Bird River	WQA - 2005	Not Impaired	Not Impaired	Not Impaired	Not Impaired	Biological Community – Insufficient Data
Gunpowder River	Not Impaired	Not Impaired	Not Impaired	Not Impaired	Not Impaired	Not Impaired
Middle River	Not Impaired	Not Impaired	Not Impaired	Not Impaired	WQA – Pb, Cd - 2003	Not Impaired
Liberty Reservoir - Streams	Not Impaired	Not Impaired	TMDL - 2009	Not Impaired	Not Impaired	Impaired – Chlorides
Liberty Reservoir - Impoundment	Phosphorus – TMDL pending EPA approval	sediment – TMDL pending EPA approval	Not Impaired	Not Impaired	WQA - Hg - Pending WQA – Cr, Pb – 2003	Not Impaired
Lower North Branch Patapsco River	WQA - 2009	TMDL - 2011	TMDL - 2009	Not Impaired	WQA – As, Zn, Pb, Hg, Cu, Cr, Cd - 2006	Impaired – Sulfates, Chlorides Impaired – Stream Alteration
Gwynns Falls	WQA - 2010	TMDL - 2010	TMDL -	Not Impaired	Not Impaired	Impaired –

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			2008			Chlorides Impaired – Stream Alteration
Jones Falls	WQA – 2010	TMDL - 2011	TMDL – 2008	Lake Roland – PCBs- TMDL pending Chlordane – TMDL - 2001	WQA – Zn, Pb, Cu - 2004	Impaired – Sulfates, Chlorides Impaired – Stream Alteration
Back River	TMDL*	Impaired	TMDL – Herring Run only - 2008	PCBs - TMDL - 2012	Not Impaired	Impaired – Sulfates, Chlorides Impaired – Stream Alteration
Baltimore Harbor	TMDL*	Not Impaired	Not Impaired	PCBs - TMDL - 2012	Not Impaired	Biological Community
GUNOH	TMDL - 2010	TMDL - 2010	Not Impaired	Impaired	Impaired -Hg in fish tissue	Not Impaired
MIDOH	TMDL - 2010	TMDL - 2010	Not Impaired	Impaired	Impaired -Hg in fish tissue WQA – Pb, Cd - 2004	Biological Community – Insufficient Data
CB2OH	TMDL - 2010	TMDL - 2010	Not Impaired	Not Impaired	Not Impaired	Not Impaired
BACOH*	TMDL – 2005, 2010	TMDL - 2010	Not Impaired	PCBs – TMDL - 2012 Chlordane – TMDL - 1999	Impaired – Hg in fish tissue WQA – Zn 2006	Biological Community – Insufficient Data
CB3MH	TMDL - 2010	TMDL - 2010	Not Impaired	Not Impaired	Not Impaired	Impaired - Biological Community
PATMH*	TMDL – 2005, 2010	TMDL - 2010	Not Impaired	PCBs – TMDL -2012 Chlordane – TMDL - 2001	Impaired – Cr, Zn Sediments	Impaired – Trash – Middle Branch, Northwest Harbor Impaired - Biological Community
Total TMDLs	5	6	7	6	3	1
Total Impaired – Need TMDL	0	0	0	1	3	15

* The nutrient TMDLs for Back River and Baltimore Harbor developed in 2005 will probably be superseded by the Chesapeake Bay TMDL, which requires greater nitrogen and phosphorus reduction than the previously developed local TMDLs.

A total of 27 TMDLs have been developed for Baltimore County waters, counting the Chesapeake Bay TMDL as a single TMDL; although it includes nitrogen, phosphorus, and sediment pollutants for 53 Maryland tidal segments and could be considered as 159 TMDLs. There are an additional 21 impairment listings that will require separate TMDLs in the future and an unknown number of additional impairment listings that will be developed once the causes of the biological community impairments are determined. Each one of these current and future TMDLs will require the development of a TMDL Implementation Plan in the future. For

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existing TMDLs, within one-year of the permit reissuance, for future TMDLs, within one year of EPA approval of the TMDL. The Chesapeake Bay TMDL has been address through the development of the Baltimore County Phase II Watershed Implementation Plan (<http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/WIPPhaseIICountyDocuments.aspx>). The categories of TMDLs are discussed below>

Nutrient TMDLs: There are 4 nutrient TMDLs for Baltimore County waters. The three drinking water reservoirs (Prettyboy, Loch Raven, and Liberty) located in Baltimore County have TMDLs either completed or submitted to EPA for approval for phosphorus. Each reservoir exceeds the water quality standards for epiliminon chlorophyll *a* and hypoliminon for dissolved oxygen. The two standards are linked through algal production, which in turn is related to the amount of phosphorus delivered to the reservoir, changes in nitrogen have been found through modeling to not have an effect on the amount of algal production within the reservoirs. This follows the general ecological principle that fresh waters are phosphorus limited and not nitrogen limited in terms of production. The increase in algal biomass can cause problems in the final drinking water product. High amounts of algae can cause taste issues with the drinking water and the algal organic matter can react with the chlorination to produce trihalomethanes in the finished water (<http://water.epa.gov/drink/contaminants/basicinformation/disinfectionbyproducts.cfm>). When the algal biomass dies it drifts through the thermocline to the hypolimnion where bacteria break down the organic matter and in the process reduce the oxygen in the hypolimnion (for further information http://www.ourlake.org/html/dissolved_oxygen.html or <http://pubs.usgs.gov/sir/2011/5090/pdf/sir2011-5090.pdf>). This in turn impacts the biological community's ability to survive.

For the Chesapeake Bay TMDL both nitrogen and phosphorus lead to increased algal growth. This has the effect in tidal water of decreasing the dissolved oxygen levels when the algae die and the algal biomass also has an effect on water clarity by intercepting the sunlight and causing shading of submerged aquatic vegetation (<http://www.chesapeakebay.net/issues/issue/nutrients>). These algae blooms may also have health effects for both the aquatic biological communities and humans (<http://www.dnr.state.md.us/bay/hab/>).

Sediment TMDLs: There are 6 sediment TMDLs for Baltimore County waters, two are related to the drinking water reservoirs, three are related to stream biological community impacts, and final sediment TMDL is related to water clarity in the Chesapeake Bay. Sediment TMDLs come from a variety of impacts. Sediment TMDLs for reservoirs are typically based on increasing the longevity of the drinking water supply (<http://www.eolss.net/Sample-Chapters/C07/E2-12-02-05.pdf>), while those for streams are based on impacts on the aquatic community (http://www.csu.edu.au/research/ilws/news/events/5asm/docs/proceedings/Harrison_Evan_139.pdf). The sediment TMDL for the Chesapeake Bay is based on water clarity standards for the support of submerged aquatic vegetation (SAV) that provides nursery habitat for a variety of fish and crabs in support of aquatic wildlife (<http://chesapeake.usgs.gov/SedimentBay605.pdf> or http://www.chesapeakebay.net/indicators/indicator/reducing_sediment_pollution).

Bacteria TMDLs: The seven bacteria TMDLs developed to date have all focused on bacteria impairments in streams, with no impairments indicated for the drinking water reservoirs, and none as yet to tidal water segments (although this may change for Baltimore Harbor). High levels of bacteria are an indicator of potential human health impacts for people using the waters for recreational purposes. The bacteria TMDLs are more tractable in terms of meeting water

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quality standards, due mainly to the input of wildlife and the current state of knowledge on bacteria dynamics in streams and effectiveness of various treatment options.

Toxics-Organics: This class of pollutants includes all those with a hydrocarbon based molecular structure and includes a variety of pesticides, polychlorinated biphenyls (PCBs), and a variety of petroleum products and their derivatives. There are two in this class that currently have TMDLs, the pesticide chlordane, and PCBs; both of these have been banned for use for several decades. The listings are typically based on presence in fish tissue and therefore available for human consumption.

Toxics-Metals: To date this category has been limited to mercury (Hg) in fish tissue related to human health. The balance of the various types of metals have not been found to be impairing biological communities to date.

Other Impairing Substances: This is a catchall category that includes trash, and ions, such as, chlorides and sulfates. The trash impairment listing for Baltimore Harbor has resulted in a TMDL that has recently completed the public comment period. The ions, chloride and sulfate have been identified as impairing the stream biological community in a number of watersheds. No TMDLs for these two pollutants have been developed as yet. An additional category of impairment has been identified as impairing the stream communities in a number of watersheds. This is stream channel alterations.

9.3 Pollutant Load Reduction Calculations and Crediting Actions

In order to conduct consistent pollutant load and pollutant load reduction calculations, Baltimore County has opted to use the loading rates from the Chesapeake Bay Program Phase 5.3 Watershed Model, as expressed in the Maryland Assessment Scenario Tool (MAST). The loading rates are based on the land/river segment in MAST. Some 8-digit watersheds have multiple land/river segments within their boundaries. Since data is expressed on an 8-digit watershed basis, mean weighted edge-of-stream (EOS) loading rates were calculated for each of the fourteen 8-digit watersheds that on entirely or partially within Baltimore County. Only the loading rates for urban impervious, urban pervious, and forest are given in Table 9-3.

Table 9-3: Edge-of-Stream (EOS) Pollutant Loading Rates by Watershed

Watershed	Total Nitrogen/Acre			Total Phosphorus/Acre			Total Sediment/Acre		
	Urban Imp.	Urban Per	Forest	Urban Imp.	Urban Per	Forest	Urban Imp.	Urban Per	Forest
Deer Creek	17.36	11.55	2.77	1.51	0.30	0.04	2,158.7	294.8	89.9
Prettyboy Reservoir	17.36	11.55	2.77	1.51	0.30	0.04	1,644.3	224.6	76.1
Loch Raven Reservoir	17.36	11.55	2.77	1.51	0.30	0.04	1,601.5	220.6	64.4
Lower Gunpowder Falls	17.36	11.55	2.77	1.51	0.30	0.04	1,946.9	265.9	64.4
Little Gunpowder Falls	17.36	11.55	2.77	1.51	0.30	0.04	2,128.5	260.7	99.0
Bird River	9.64	6.39	1.53	1.48	0.28	0.04	631.0	86.4	22.0
Gunpowder River	9.64	6.39	1.53	1.48	0.28	0.04	766.7	104.7	22.0
Middle River	9.64	6.39	1.53	1.48	0.28	0.04	716.2	97.8	26.4
Liberty Reservoir	17.36	11.56	2.79	1.51	0.30	0.04	1,704.8	232.8	70.9
Patapsco River	14.49	9.73	2.78	1.26	0.25	0.04	1,549.8	208.1	88.0
Gwynns Falls	17.34	11.55	2.78	1.51	0.30	0.04	2,057.0	280.4	82.2
Jones Falls	17.36	11.55	2.77	1.51	0.30	0.04	968.4	132.3	29.7
Back River	9.64	6.39	1.53	1.48	0.28	0.04	558.9	76.9	24.7
Baltimore Harbor	9.64	6.40	1.53	1.48	0.28	0.04	675.9	92.3	31.05

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There are several types of restoration programs and projects completed by EPS and the local EPS funded watershed associations that result in quantifiable pollution reduction. This section details how these numbers are obtained.

9.3.1 Stream Restoration

In December of 2011 the state of Virginia requested an interim stream restoration pollution reduction rate from the EPA in lieu of the original Chesapeake Bay Program approved rates. The interim rate was granted and is higher than the previous rate by an order of magnitude. The new interim rate is available for use in WIP planning by all Bay states and localities. The final rate will be developed through the expert panel process, and will be used in milestone model runs. Interim rates are shown below:

- Total Nitrogen – 0.20 pounds per linear foot of stream restoration
- Total Phosphorus – 0.068 pounds per linear foot of stream restoration
- Total Suspended Solids – 54.25 pound per linear foot of stream restoration

9.3.2 Shoreline Enhancement

To obtain nutrient reduction numbers associated with shoreline enhancement projects, it must be determined how much sediment the project is theoretically preventing from entering a waterway. To calculate an estimate of annual erosion at a given shoreline site, the equation $V = LEB$ is used, where 'V' is volume eroded, 'L' is length of shoreline, 'E' is erosion rate and 'B' is bank height. This equation yields a volume expressed in cubic feet per year. Cubic feet are converted to pounds using a soil bulk density of 93.6 lb/ft³. Pounds are then converted to tons using a factor of 0.0005. Lengths of shoreline and bank heights are taken from engineering and project plans prepared by consultants for Baltimore County and erosion rates from Department of Natural Resources website, <http://shorelines.dnr.state.md.us> are used.

Nitrogen and Phosphorus loading rates for shorelines are taken from *Eroding Bank Nutrient Verification Study for the Lower Chesapeake Bay* (Ibison, 92). The mean total N and total P loading concentrations in the study are 0.73 lb/ton and 0.48 lb/ton respectively (p. 44).

9.3.3 Stormwater Management Facilities and Retrofits

Drainage areas for stormwater management facilities and retrofits are delineated to determine the acreage on which to apply the pollution reduction efficiencies shown in Table 9-4. Efficiencies are applied to pollutant loads based on land use of these drainage areas. Efficiencies used are taken from the Maryland Assessment and Scenario Tool (MAST).

Table 9-4: Percent Removal Efficiency of BMPs

BMP	Pollutants		
	TN	TP	TSS
Detention Facilities	5	10	10
Extended Detention Facilities	20	20	60
Wet Ponds and Wetlands	20	45	60
Infiltration Practices	80	85	95
Filtration Practices	40	60	80
Bioretention Practices	70	75	80
ESD Practices	50	60	90

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Detention Facilities = Detention Pond and Hydrodynamic Devices
 Extended Detention Facilities = Dry Extended Detention Ponds
 Wet Ponds and Wetlands = Wet Pond and Shallow Marsh
 Infiltration Practices = Infiltration Trench and Infiltration Basins, Porous Paving, and
 Dry Wells
 Filtration Practices = Sand filters

Section 9.6.2 describes the calculation of pollutant loads for individual watersheds. The pollutant load reductions for stormwater management facility retrofits and conversions use the loads calculated in accordance with Section 9.6.2 and the pollutant removal efficiencies based on facility type found in Table 9-4.

9.3.4 Tree Planting

Tree planting occurs on public and private land, in 100' stream buffers and open areas. Nutrient reductions associated with stream buffer and tidal buffer plantings are obtained using the sum of a reduction efficiency and a land use change. For stream buffers, a reduction efficiency of 25% for Nitrogen, 50% for Phosphorus and 50% for sediment is applied to the area planted using the average loading rate for the entire watershed in which the buffer planting is done. This average loading rate is used because this efficiency is meant to apply to areas upland of the buffer that drain to the stream where the buffer is located. Efficiencies of 19% for N, 45% for P and 60% for sediment are used for tidal buffers. The land use change is from a pervious urban nutrient load to a forested nutrient load, using loading rates from the Phase 5.3 Chesapeake Bay Program (CBP) Model. Table 9-3 shows these loading rates. Open area plantings (non-buffer) use only the land use change to calculate load reductions. When an area planted is not know, the ratio of 100 trees = 1 acre is used for calculations as per the MDE guidance document *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* (MDE June, 2011). This represents a change from last year's report where 200 trees = 1 acre was used.

9.3.5 Downspout Disconnections, Rain Barrels and Rain Gardens

Individual downspouts that are directly connected to the storm drain system, either through piping or by discharging to impervious surfaces that lead to storm drains, can be disconnected from the system. Pollutant reductions are associated with the following types of disconnections using loading rates and reduction efficiencies from the Phase 5.3 CBP Watershed Model:

- Downspout Disconnection & Rain Barrels - Rooftop area disconnected is estimated and the impervious urban pollutant-loading rate for the respective watershed (see Table 9-3) is calculated for this estimated area. A default rooftop area of 250 sq. ft. is used when actual area is not available. Pollutant reduction efficiencies are then applied to the estimated pollutant load from the rooftop. Reduction efficiencies are taken from the MDE Guidance Document (June 2011) and are shown in Table 9-5.
- Rain Gardens - Rain gardens drain specific areas of pervious and/or impervious surface. By applying the watershed specific pollutant loading rates from Table 9-3 to the drainage area of the rain garden and applying the reduction efficiencies from Table 9-5 to these loads, pollutant reduction numbers for rain gardens can be determined. Reduction efficiencies for rain gardens are taken from MAST.

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Table 9-5: Percent Removal Efficiency of BMPs

BMP	Pollutants		
	TN	TP	TSS
Downspout Disconnections	50	60	90
Rain Barrels	50	60	90
Rain Gardens	70	75	80

9.4 Restoration Progress

9.4.1 Local Watershed Associations

Baltimore County has several active volunteer organizations whose mission is focused on enhancement of environmental resources. In an effort to expand their ability to organize and conduct restoration activities, EPS developed a grant program entitled, *Watershed Association Restoration Planning and Implementation Grant* program. This grant program was developed to keep permanent staff with the county's local Watershed Associations. The groups implement restoration projects and educational activities, and also participate in County restoration planning, support the Stream Watch program. The funds can be used to leverage additional grant funding. The grant program captures an accounting of the groups' efforts and then adds these restoration activities into the County's totals for meeting nutrient reduction goals. Table 9-6 below is the nutrient reductions by group from 2006 through 2010. With the change to fiscal year reporting and for purposes of tracking progress in meeting the Baltimore County Watershed Implementation Plan (WIP) 2-year milestones for addressing the reduction requirements of the Chesapeake Bay TMDL, the first half of 2011, FY12 and FY13 data is presented in Table 9-7.

Table 9-6: Watershed Groups' Projects from 2006-2010

Watershed Group	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)
2006-2010			
Gunpowder Valley Conservancy (GVC)	832.5	32.6	23,973.1
Blue Water Baltimore (BWB)	351.6	19.0	10,239.0
Patapsco Heritage Greenway (PHG)	27.2	5.7	5,983.8
Prettyboy Watershed Association (PWA)	51.5	2.3	1,536.9
Back River Restoration Committee (BRRC)	10.3	0.5	121.2
TOTALS	1,273.1	60.0	41,853.9

Table 9-7: Watershed Groups' Projects Pollutant Reductions 2011-FY13

Watershed Group	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)
GVC	552.6	20.0	10,557.5
BWB	88.5	4.0	2,059.0
PHG	11.4	2.1	2,123.2
PWA	154.0	6.8	4,324.9
BRRC	28.3	2.1	769.0
DRC	10.1	0.8	269.2
TOTALS	844.7	35.8	20,102.9

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Starting in 2010, Baltimore County began offering 55 gallon rain barrels for sale at their annual compost bin sale. This paired well with the compost bins because, as the bins help to reduce material sent to county landfills, rain barrels help reduce stormwater flowing to local streams.

In the future, Baltimore County may implement an audit program to determine the rate of installation of the rain barrels and the rate at which those installed are emptied prior to storm events. This will improve the accuracy of the pollutant reduction estimates attributed to the sale. For the purposes of this report, 100% of barrels sold are assumed to have been installed and frequently emptied, maximizing the effectiveness of storm water benefits.

Table 9-8 shows the barrels sold per year totals and to Baltimore County addresses. Table 9-9a shows pollutants reduced per watershed by year as a result of the rain barrel sales. Table 9-9b shows pollutants reduced per watershed by year as a result of the rain barrel sales from 2011-FY13 for tracking WIP 2-year milestones. Locations are based on addresses given on the receipts from the rain barrel sales. Each rain barrel is estimated to drain 250 sq ft of rooftop for pollution reduction calculation purposes. Note that this analysis of the receipts showed lower numbers sold for each year then reported by the vendor, especially for 2010. This will need to be addressed and possibly re-analyzed in future reports. Pollutant reductions are calculated as described in section 9.3.5.

Table 9-8: Baltimore County Rain Barrel Sales by Calendar Year

Year	# Barrels Sold	# Barrels Sold to Baltimore County Addresses
2010	609	469
2011	1,250	890
2012	825	620
2013	806	536
Totals	3,490	2,515

Table 9-9a: Baltimore County Rain Barrel Total Sales by 8 Digit Watershed and Associated Nutrient Reductions

Watershed	# Barrels Sold	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Estimated Impervious Acres Addressed
Lower Susquehanna					
Deer Creek	4	0.2	0.0	44.6	0.0
Upper Western Shore					
Loch Raven	445	22.2	2.3	3,681.2	2.6
Lower Gunpowder	339	16.9	1.8	3,399.1	1.9
Bird River	262	7.3	1.3	853.9	1.5
Little Gunpowder	64	3.2	0.3	703.7	0.3
Gunpowder	29	0.8	0.1	114.8	0.2
Middle River	71	2.0	0.1	262.7	0.4
Patapsco/Back River					
Liberty	9	0.4	0.1	79.2	0.0
Patapsco	214	8.9	0.9	1,713.0	1.3

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Gwynns Falls	148	7.4	0.8	1,572.4	0.8
Jones Falls	206	10.3	1.1	1,030.5	1.2
Back River	573	15.9	2.9	1,654.2	3.3
Baltimore Harbor	131	3.6	0.7	457.3	0.8
Prettyboy	20	1.0	0.1	169.9	0.1
Totals	2,515	99.9	12.5	15,736.4	14.5

Table 9-9b: Baltimore County Rain Barrel Sales 2011-FY13 by 8 Digit Watershed and Associated Nutrient Reductions

Watershed	# Barrels Sold	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)	Estimated Impervious Acres Addressed
Lower Susquehanna					
Deer Creek	3	0.1	0.0	33.5	0.0
Upper Western Shore					
Prettyboy	15	0.7	0.1	127.4	0.1
Loch Raven	410	20.4	2.1	3,391.6	2.4
Lower Gunpowder	277	13.8	1.4	2,785.6	1.6
Bird River	182	5.0	0.9	593.2	1.0
Little Gunpowder	55	2.7	0.3	604.7	0.3
Gunpowder	26	0.7	0.1	103.0	0.1
Middle River	61	1.7	0.3	255.7	0.4
Patapsco/Back River					
Liberty	9	0.4	0.0	79.3	0.1
Patapsco	180	7.5	0.8	1,440.9	1.0
Gwynns Falls	115	5.7	0.6	1,221.8	0.7
Jones Falls	175	8.7	0.9	875.4	1.0
Back River	435	12.0	2.2	1,255.8	2.5
Baltimore Harbor	103	2.8	0.5	359.6	0.6
Totals	2,046	82.6	10.4	13,097.3	11.7

9.4.3 Community Reforestation Program

The Community Reforestation Program (CRP) was established by the Department of Environmental Protection and Sustainability to provide a dedicated workforce for planting, monitoring, and maintaining forest mitigation projects. The Program is funded primarily through fees-in-lieu of mitigation for forests removed as a result of public and private land development, as required by the implementation of the County's Forest Conservation Act and Chesapeake Bay Critical Area Regulations. The plantings conducted with mitigation monies will not be given nutrient reduction credits due to the fact that these tree plantings are offsetting deforestation. The CRP is the only full-time countywide reforestation mitigation program among Maryland's counties.

The CRP includes a four-person reforestation crew that carries out year-round reforestation operations. The crew is based at a 1-acre site in eastern Baltimore County that is provided by the Department of Recreation and Parks. This home base houses a growing out nursery for 10,000 tree seedlings; equipment and machinery needed for planting, monitoring, and maintaining the reforestation projects; and office space for the reforestation team.

Occasionally, the CRP will undertake special grant-funded projects to improve water quality and groundwater recharge, as well as wildlife habitat. Unlike the plantings conducted with fee-in-lieu monies, grant funded projects will be given nutrient reduction credit. The most recent example is the expansion of forest buffers and the reforestation of fields on private rural

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properties in 2009. Tables 9-10 and 9-11 show these projects by calendar year and by watershed respectively. The method for calculating pollutant reduction involves a land use conversion from urban pervious to forest. Additional reduction efficiency is applied for trees planted within a riparian buffer. These methods are described in Section 9.3.4.

Table 9-10: Baltimore County Non-Mitigation Reforestation Projects by Calendar Year Through FY13

Year	New Acres Planted With Non-Mitigation Funds	N Reduction from Non-Mitigation Projects (lbs/yr)	P Reduction From Non-Mitigation Projects (lbs/yr)	Sed Reduction From Non-Mitigation Projects (lbs/yr)
2005	17.2	1605.	5.4	3,494.1
2006	0.2	1.3	0.1	34.4
2008	9.6	106.1	4.7	3,278.3
2009	12.5	132.4	5.5	3,785.9
Totals	39.5	400.3	15.7	10,592.7

Table 9-11: Baltimore County Non-Mitigation Reforestation Projects by Watershed Through FY13

Watershed	Acres Planted With Non-Mitigation Funds	N Reduction from Non-Mitigation Projects (lbs/yr)	P Reduction From Non-Mitigation Projects (lbs/yr)	Sed Reduction From Non-Mitigation Projects (lbs/yr)	Impervious Acre Equivalent
Upper Western Shore					
Prettyboy	11.5	120.7	5.0	3,272.6	4.4
Loch Raven	28.1	279.6	10.7	7,320.1	10.7
Grand Totals	39.6	400.3	15.7	10,592.7	15.0

9.4.4 Energy Trees

In June 2009, Baltimore County was awarded an Energy Efficiency and Conservation Block Grant from the federal Department of Energy. The EECBG Program is funded by the American Reinvestment and Recovery Act with the intent to reduce fossil fuel emissions, lessen energy use, improve energy efficiency in the transportation and building sectors, and create and retain jobs. Baltimore County was awarded nearly \$7.5 million to implement green renovations at the Liberty Center, execute energy audits for business and government structures, perform energy retrofits, and plant trees to increase the energy efficiency of public buildings. The Baltimore County Department of Environmental Protection and Sustainability was responsible for the tree-planting portion of the grant (\$500,000), and worked closely with the BCPS Grounds Manager and the Property Management Division of the Office of Budget and Finance to place trees at 75 different sites.

Native shade tree species, such as oak, maple, birch, linden, and elm were selected for planting as a result of their superior height and breadth, and for their ability to survive in the local climate. Particular preference was given to the oaks, as they also supply habitat and food for an abundance of native songbirds, butterflies, and other wildlife. 15-20' native shade trees were planted around elementary, middle and high schools; community centers; libraries; fire stations; police precincts; health centers; and senior centers. The trees were strategically placed within 60' of the east, south, and west-facing building façades in order to maximize the shade cast onto the buildings during the warmest times of the day, thus reducing the strain on air conditioners.

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For protection, the trees are equipped with deer/disturbance shelters and mower guards. Baltimore County's on-call landscape contractor installed the trees and will monitor and maintain them for two years.

With supplies, labor, and two-year tree upkeep costing an average of \$516 per tree, Baltimore County achieved the ambitious goal of planting 954 trees. The contractor will continue to perform regular maintenance visits for two years and will replace any trees that decline within that period. Trees were planted at 75 different sites (47 public schools, 8 police precincts and PAL centers, 7 community centers, 5 senior centers, 3 community colleges, 2 libraries, 2 fire stations, and 1 health center). In a true demonstration of cooperation and teamwork, EPS worked with county employees and citizens across 8 different county agencies and all 7 council manic districts to plant trees where they were needed most. Table 9-12 below shows the watersheds and nutrient reductions that result from this project.

Table 9-12: Energy Trees Planted by Watershed and Associated Pollutant Reductions

	Back River	Baltimore Harbor	Bird River	Gunpowder River	Gwynns Falls	Jones Falls	Loch Raven Reservoir	Lower Gunpowder
FY12	185	193	19	16	178	19	43	64
N Red	9.0	9.4	0.9	0.8	15.6	1.7	3.8	5.6
P Red	0.4	0.5	0.0	0.0	0.5	0.0	0.1	0.2
Sed Red	96.6	118.1	12.2	12.9	352.9	19.5	67.2	121.2
Imp Acre Eq	0.7	0.7	0.1	0.1	0.7	0.1	0.2	0.2
	Middle River	Patapsco River	Totals					
FY12	16	221	954					
N Red	0.8	15.4	62.9					
P Red	0.0	0.5	2.3					
Sed Red	11.4	265.5	1,077.5					
Imp Acre Eq	0.1	0.8	3.6					

9.4.5 Growing Home Campaign

The *Growing Home Campaign* provided a needed alternative for the control of urban non-point source pollution. Tables 9-13 and 9-14 show Growing Home data for the Upper western Shore and Patapsco/Back Basins respectfully. Shown in these table are the number of trees purchased, their planting location by 8-digit watershed and associated nutrient reductions obtained using MAST (Maryland Assessment Scenario Tool) loading rates, a land use conversion from pervious urban land to forested land, and assuming a conversion factor of 100 trees per acre. The Growing Home Campaign was discontinued in 2011 due to declining coupon usage and lack of native canopy trees sold under the program.

Table 9-13: Number of Growing Home Trees Planted in the Upper Western Shore Basin

	Deer Creek	Prettyboy Reservoir	Loch Raven	Lower Gunpowder	Little Gunpowder	Bird River	Gunpowder River	Middle River
2006	25	4	195	70	11	36	0	16
2007	12	3	153	87	31	72	23	35
2008	16	11	192	95	25	26	0	37
2009	17	16	206	54	31	87	19	70
2010	3	12	227	56	8	56	32	47
2011	0	4	96	31	12	39	20	25

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Total	73	50	1069	393	118	316	94	230
N Red.	6.4	4.4	93.9	34.5	10.4	15.4	4.6	11.2
P Red.	0.2	0.1	2.8	1.0	0.3	0.8	0.2	0.6
Sed. Red.	149.8	74.2	1,670.5	741.7	226.2	203.5	72.6	164.2
Imp. Acre Equivalent	0.3	0.2	4.1	1.5	0.4	1.2	0.4	0.9

Table 9-14: Number of Growing Home Trees Planted in the Patapsco/Back River Basin

	Liberty Reservoir	Patapsco L. N. Br.	Gwynns Falls	Jones Falls	Back River	Baltimore Harbor
2006	0	19	34	43	58	2
2007	5	67	74	74	77	12
2008	2	49	48	149	84	37
2009	13	86	28	102	116	10
2010	4	46	35	82	139	29
2011	7	31	16	69	72	23
Total	31	298	235	519	546	113
N Red.	2.7	20.7	20.6	45.6	26.5	5.5
P Red.	0.1	0.6	0.6	1.3	1.3	0.3
Sed. Red.	49.8	357.6	462.3	536.2	285.0	69.2
Imp. Acre Equivalent	0.1	1.1	0.9	2.0	2.1	0.4

Table 9-15 shows nutrient reductions achieved through the Growing Home campaign. These numbers are obtained using a land use conversion from pervious urban land to forested land, assuming an average of 200 trees per acre.

Table 9-15: Growing Home Trees Associated Nutrient Reductions

Year	Trees Planted	Equivalent Acres Planted	N Reduction (lbs/yr)	P Reduction (lbs/yr)	Sed Reduction (lbs/yr)
2006	513	5.1	40.3	1.3	5,980.2
2007	725	7.3	53.9	1.8	7,561.4
2008	771	7.7	59.6	1.9	8,211.8
2009	855	8.6	61.7	2.1	7,978.7
2010	776	7.8	55.4	1.9	7,073.7
2011	445	4.5	31.5	1.1	3,879.7
Totals	4,085	40.9	302.4	10.2	40,685.5

9.4.6 Tree-Mendous Maryland Program in Baltimore County

Baltimore County continues to partner with the MD DNR to actively promote the Tree-Mendous Maryland Program. In 2012, EPS provided technical assistance and received requests for free delivery of 8 orders, totaling 349 trees, of which 132 were delivered to the planting sites by EPS staff. The Tree-Mendous Maryland program in Baltimore County continues to be a valuable component of the effort to increase urban, suburban, and rural forest cover in Baltimore County. During the course of the 44 planting seasons since the program has been in existence, EPS has delivered approximately 13,000 trees in 544 orders requesting free delivery, serving school and neighborhood groups in hundreds of communities. Figure 9-2 below indicates the numbers of trees delivered by Baltimore County since program inception. Since 2004, EPS has been tracking the total number of Tree-Mendous trees ordered by Baltimore County groups versus the

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number delivered free by EPS. When tree orders that did not request free delivery are factored in for the years 2004 to 2012, the approximate number of Tree-Mendous trees planted yearly in the County remains at about 1,200 trees. Future reports may attempt to quantify the nutrient reductions from this program.

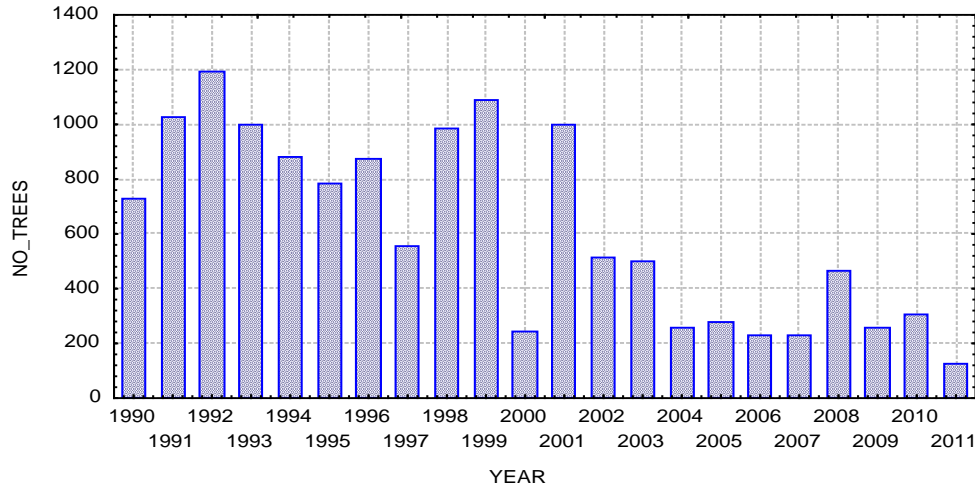


Figure 9-2: Number of trees obtained through the Tree-Mendous Maryland Program with technical assistance and free tree delivery by EPS between 1990 and 2011.

9.4.7 Big Tree Sale

EPS hosted its first Big Tree Sale in 2009. In 2011, Big Tree Sales were held on May 14th and October 15th. There were 199 total trees sold at the sales in 2011 with 146 being sold to address in Baltimore County. Watershed locations for all trees sold are not available, but nutrient reductions for those with location data that are located within Baltimore County are shown in Table 9-16 and by fiscal year in Table 9-17. For the sake of producing conservative nutrient reduction estimates, trees are presumed planted in upland areas and not in stream buffers.

Table 9-16: Big Tree Sale #s and Associated Nutrient Reductions Through Calendar Year 2010

8 Digit Watershed	2009	2010	Total	N Red	P Red	Sed Red	Imp Ac Eq
Deer Creek	0	5	5	0.4	0.0	10.3	
Prettyboy	3	1	4	0.4	0.0	6.0	
Loch Raven	92	72	164	14.4	0.4	256.3	
Lower Gun	12	1	13	1.1	0.0	24.6	
Little Gun	0	0	0	-	-	-	
Bird River	0	0	0	-	-	-	
Gunpowder River	0	0	0	-	-	-	
Middle River	0	0	0	-	-	-	
Liberty	0	11	11	1.0	0.0	17.8	
Patapsco	4	5	9	0.6	0.0	10.8	
Gwynns Falls	3	8	11	1.0	0.0	21.8	
Jones Falls	0	3	3	0.3	0.0	3.1	
Back River	0	0	0	-	-	-	
Baltimore Harbor	0	0	0	-	-	-	
Totals	114	106	220	19.2	0.4	350.7	0.8

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Table 9-17: Big Tree Sale #s 2011-FY13 by 8 Digit Watershed and Associated Nutrient Reductions

8 Digit Watershed	Totals 2011-FY13	N Red	P Red	Sed Red	Imp Ac Eq
Deer Creek	9	0.8	0.0	18.5	0.0
Prettyboy	32	2.8	0.1	47.5	0.1
Loch Raven	523	45.9	1.4	817.3	2.0
Lower Gun	32	2.8	0.1	60.6	0.1
Little Gun	38	3.3	0.1	72.9	0.1
Bird River	35	1.7	0.1	2.5	0.1
Gunpowder River	6	0.3	0.0	4.8	0.0
Middle River	14	0.7	0.0	10.0	0.1
Liberty	22	1.9	0.1	35.6	0.1
Patapsco	31	2.2	0.1	37.2	0.1
Gwynns Falls	7	0.6	0.0	13.9	0.0
Jones Falls	208	18.3	0.5	213.4	0.8
Back River	126	6.1	0.3	65.8	0.5
Baltimore Harbor	6	0.3	0.0	3.7	0.0
Totals	1,089	87.7	2.8	1,4232.7	4.1

9.4.8 Capital Restoration Projects – Upper Western Shore

9.4.8.1 Deer Creek Watershed

Due to the rural nature of this watershed, a watershed management plan is not required by the NPDES – Municipal Stormwater Discharge Permit. Baltimore County’s portion of this watershed is approximately eleven square miles. There are no capital improvement projects existing in or currently planned for this watershed. Deer Creek is part of the Susquehanna River Basin. The predominate land use in the watershed is agriculture. Baltimore County participated in a Deer Creek WRAS, which was prepared by Harford County.

9.4.8.2 Prettyboy Reservoir Watershed

There have not been any capital improvement projects completed by Baltimore County EPS in the Prettyboy watershed to date. Figure 9-3 shows the locations of watershed group projects.

Table 9-18: CPO Projects in the Prettyboy Reservoir Watershed

Capital Improvement Projects Through FY13 Prettyboy Reservoir Watershed								
Project	Facility Type	DA (LF)	Cost	Year	Removal Rate (lb./year)			Impervious Acres
					TN	TP	TSS	
Completed Projects								
None								
Projects Under Design or Construction								
None								

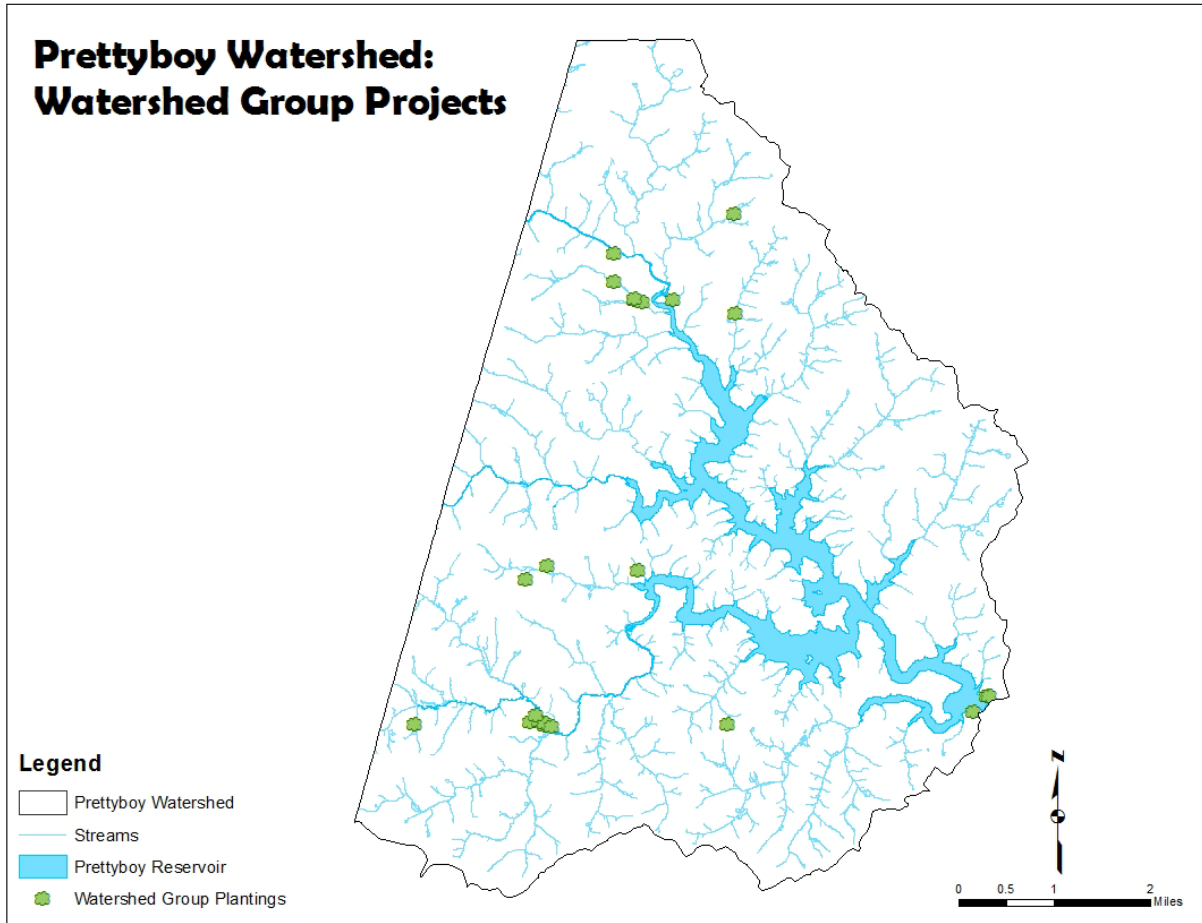


Figure 9-3: Watershed Group Projects in the Prettyboy Watershed

9.4.8.3 Loch Raven Reservoir Watershed

Capital Improvement projects completed by Baltimore County EPS in the Loch Raven watershed are shown in Table 9-19. Figure 9-4 shows the locations of these projects and locations of watershed group projects.

Table 9-19: CPO Projects in the Loch Raven Reservoir Watershed

Capital Improvement Projects Through FY13 Loch Raven Reservoir Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Spring Branch Retrofit	NWET	49.5	276,473	97	130.0	13.6	17,050	12.1
Spring Branch SR	SR	(10,000)	1,868,380	97	2,000.0	680.0	542,500	100
Long Quarter Branch Ret	NWET	134.0	150,000	99	403.6	58.2	78,408	67.8
Long Quarter Branch SR	SR	(2,300)	564,581	99	460.0	156.4	124,775	23
Dulaney Valley Branch SR	SR	(1,700)	220,000	98	340.0	115.6	92,225.0	17
East Beaver Dam Run I	SR	(2,000)	372,000	00	400.0	136.0	108,500.0	20
Goodwin Run @ Padonia	SR	(700)	491,000	02	140.0	47.6	37,975.0	7
Hampton Branch	SR	(2,500)	630,000	04	500.0	170.0	135,625.0	25
Western Run@Ashland Ch	SR	(500)	365,675	04	100.0	34.0	27,125.0	5
Spring Branch II SR	SR	(2,500)	1,080,495	08	500.0	170.0	135,625.0	25

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TOTALS		183.5 (22,200)	6,018,604		4,973.6	1,581.4	1,299,808.0	301.9
Projects Under Design or Construction								
East Beaver Dam Run II	SR	(1,600)	765,846					
Kelly Branch @ Dulny Vly	SR	(3,500)	949,870					
Abbreviations								
NWET: New Wet Pond			RET: Retrofit			SR: Stream Restoration		

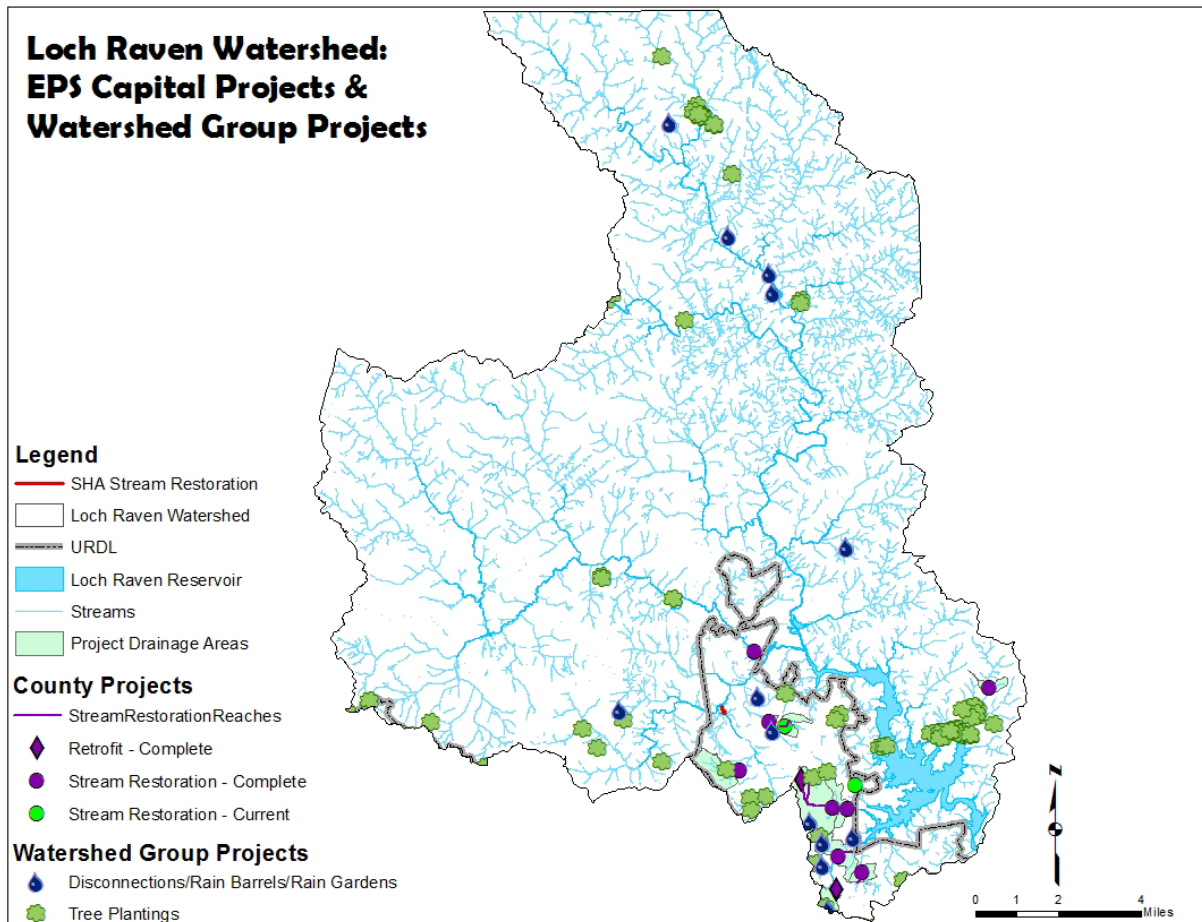


Figure 9-4: EPS Capital Projects and Watershed Group Projects in the Loch Raven Watershed

9.4.8.4 *Lower Gunpowder Watershed*

Capital Improvement projects completed by Baltimore County EPS in the Lower Gunpowder River watershed are shown below in Table 9-20. Figure 9-5 shows the locations of these projects and locations of watershed group projects.

Table 9-20: CPO Projects in the Lower Gunpowder Falls Watershed

Capital Improvement Projects Through FY13 Lower Gunpowder River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Minebank Run I	SR	(7,000)	1,189,684	00	1,400.0	476.0	379,750	70
Northwind @ Simms	REP	23.8	8,000	04	na	na	na	na
Minebank Run II	SR	(10,000)	4,400,000	05	2,000.0	680.0	542,500	100

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Minebank LRHS Trib Retro								
Minebank Run Trib @ Waller	SR	(482)	258,958	08	96.4	32.8	26,148.5	5
Gunpowder Falls @ Cromwell (DPW)	SR	(1,500)	2,500,000	09	300.0	102.0	81,375.0	15
Jennifer Branch	SR	(6,100)	3,449,803	13	1,220	414.8	330,925.0	61
Cedarside Farm Pond #393	CNV	15.4	47,061	14	81.0	6.4	9,989.0	5.1
Robin Ridge Pond 2 #1762	CNV	6.0	unk	14	32.1	2.4	3,698.4	1.8
TOTALS		45.2 (25,082)	11,853,506		5,129.5	1,714.4	1,374,385.9	257.7
Projects Under Design or Construction								
Lower Minebank	SR	(3,000)	1,634,000					
Lower Gunpowder @ Proctor	SR	(2,000)	1,500,000					
Abbreviations:								
REP: Repair			SR: Stream Restoration					

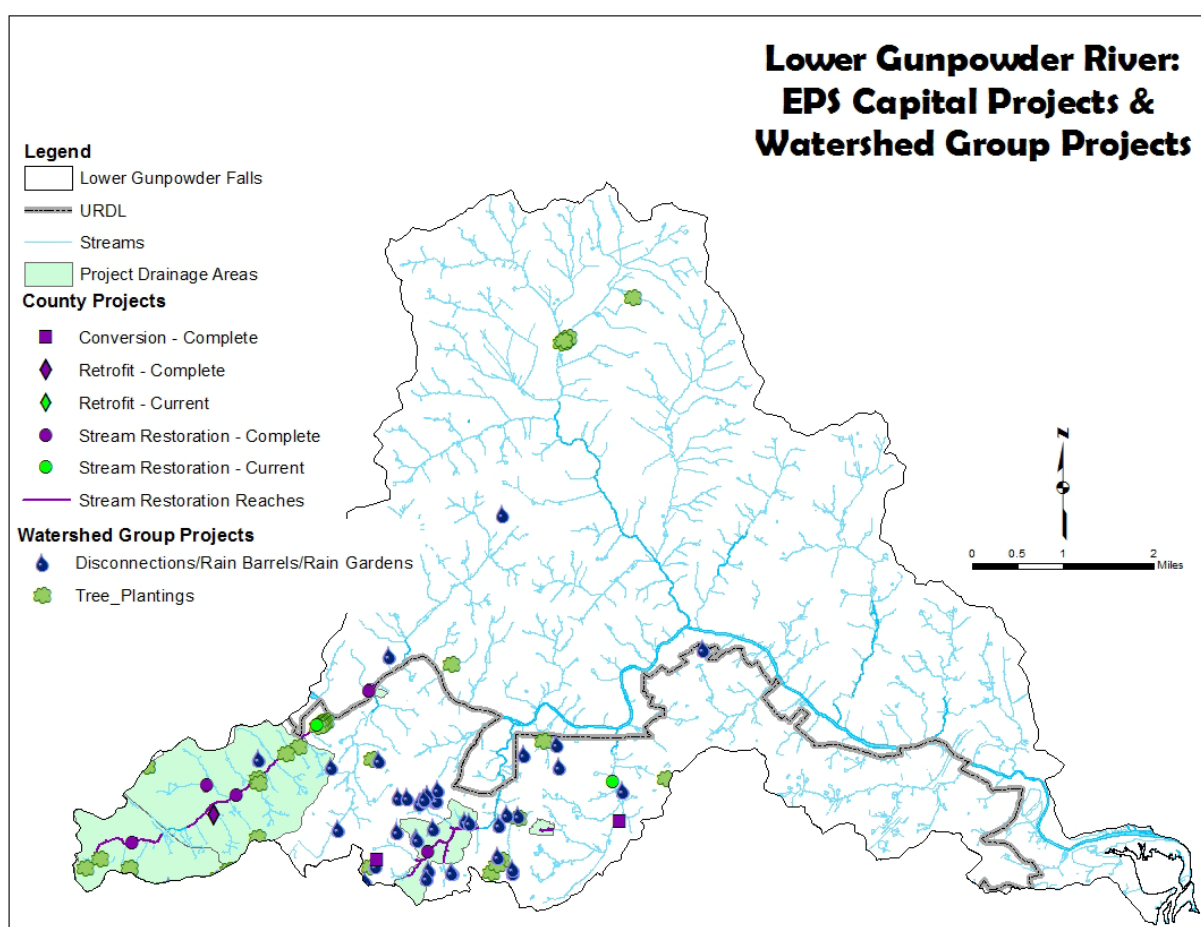


Figure 9-5: EPS Capital Projects and Watershed Group Projects in the Lower Gunpowder Watershed

9.4.8.6 Little Gunpowder Falls Watershed

No capital restoration projects have been completed in the Little Gunpowder Falls watershed.

9.4.8.7 Bird River Watershed

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Capital Improvement projects completed by Baltimore County EPS in the Bird River watershed are shown below in Table 9-21. Figure 9-6 shows the locations of these projects and locations of watershed group projects.

Table 9-21: Bird River Watershed – CIP Status

Capital Improvement Projects Through FY13 Bird River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Impervious Acres
					TN	TP	TSS	
Completed Projects								
Burnam Woods	CNV	34.2	11,687	95	55.7	12.1	6,446.4	11.5
Featherhill	CNV	77.5	18,013	95	105.6	19.1	9,815.2	18.9
Lawrence Hill	CNV	52.5	102,091	96	73.6	12.1	6,065.7	10.2
S Fork WMR SR	SR	(1,900)	391,803	98	380.0	129.2	589,000	19.0
N Fork WMR @ Perryvale	SR	(800)	120,000	99	160.0	54.4	248,000	8.0
Perryvale Retrofit	CNV	44.6	120,000	99	68.7	13.8	7,213.1	16.2
S Fork @ Franklin Square	NWET	32.2	935,416	99	56.6	6.6	8,288.6	13.3
White Marsh Mall Retrofit	CNV	108.5	435,838	99	298.0	51.2	24,283.7	33.6
White Marsh Bus. Comm.*	RET	53.9	235,597	99	na	na	na	na
N Fork WMR @ Slvr Mdw	SR	(400)	128,945	99	80.0	27.2	124,000	4.0
White Marsh Run SR	SR	(4,000)	982,387	00	800.0	272.0	1,240,000	40.0
WMR @ Woodcroft	SR	(2,000)	700,000	00	400.0	136.0	620,000	20.0
Evergreen Pond Retrofit	CNV	52.8	40,828	02	39.0	8.2	4,330.7	9.1
N. Fork White Marsh Run	SR	(7,000)	1,239,140	04	1,400.0	476.0	2,170,000	70.0
East Br. Honeygo Run	SR	(4,000)	1,330,000	04	800.0	272.0	1,240,000	40.0
S Fork @ Franklin Sq SR	SR	(2,600)	600,000	04	520.0	176.8	806,000	26.0
S Fork WMR@ Kings Ave.	SR	(2,500)	800,000	10	500.0	170.0	775,000	25.0
WMR @ Orbitan	SR	(300)	175,000	10	60.0	20.4	93,000	3.0
TOTALS		456.2 (25,500)	8,366,745		5,797.2	1,857.1	7,971,443.4	367.8
Projects Under Design or Construction								
WMR @ WM Rd	SR	(10,000)	3,880,632					
N. Fork II West Branch	SR	(8,000)	1,948,250					
Magnolia	RET	6.5	486,500					
Abbreviations CNV: SWM Pond Conversion SR: Stream Restoration *This project is no longer there due to I-95 expansion NWET: New Wet Pond RET : Retrofit								

Bird River: EPS Capital Projects & Watershed Group Projects

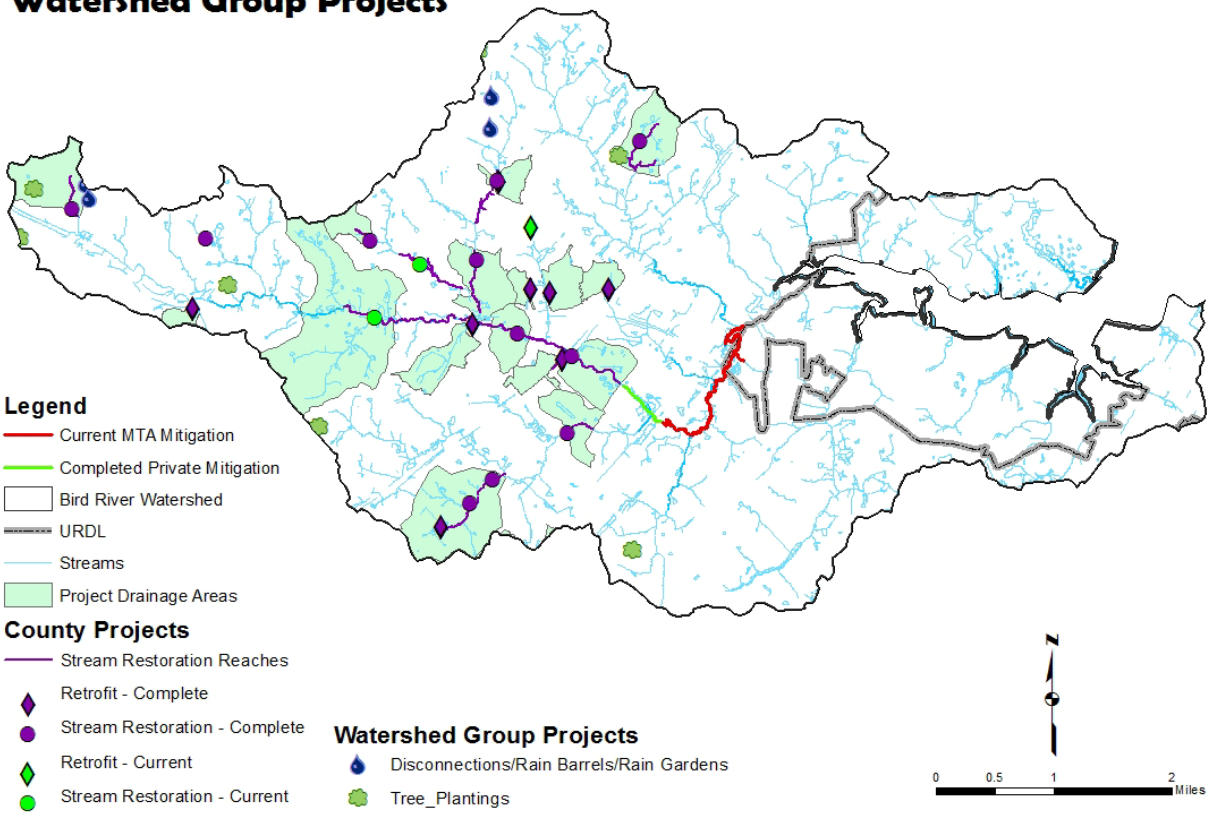


Figure 9-6: EPS Capital Projects and Watershed Group Projects in the Bird River Watershed

9.4.8.8 Gunpowder River Watershed

Capital Improvement projects completed by Baltimore County EPS in the Gunpowder River watershed are shown below in Table 9-22. Figure 9-7 shows the locations of these projects.

Table 9-22: Gunpowder River Watershed – CIP Status

Capital Improvement Projects Through FY13 Gunpowder River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Impervious Acres
					TN	TP	TSS	
Completed Projects								
Carrollwood Shoreline	SE	(140)	150,000	93	20.5	13.5	56,160.0	5.6
Carrollwood Park	RET	52.9	350,000	95	80.3	17.2	11,793.9	19.6
Carrollwood Shoreline Replacement	REP	na	207,645	13	na	na	na	na
TOTALS		52.9 (140)	707,645		114.2	32.1	67,953.9	25.2
Abbreviations								
REP: Repair			SE: Shoreline Enhancement			RET: Retrofit		

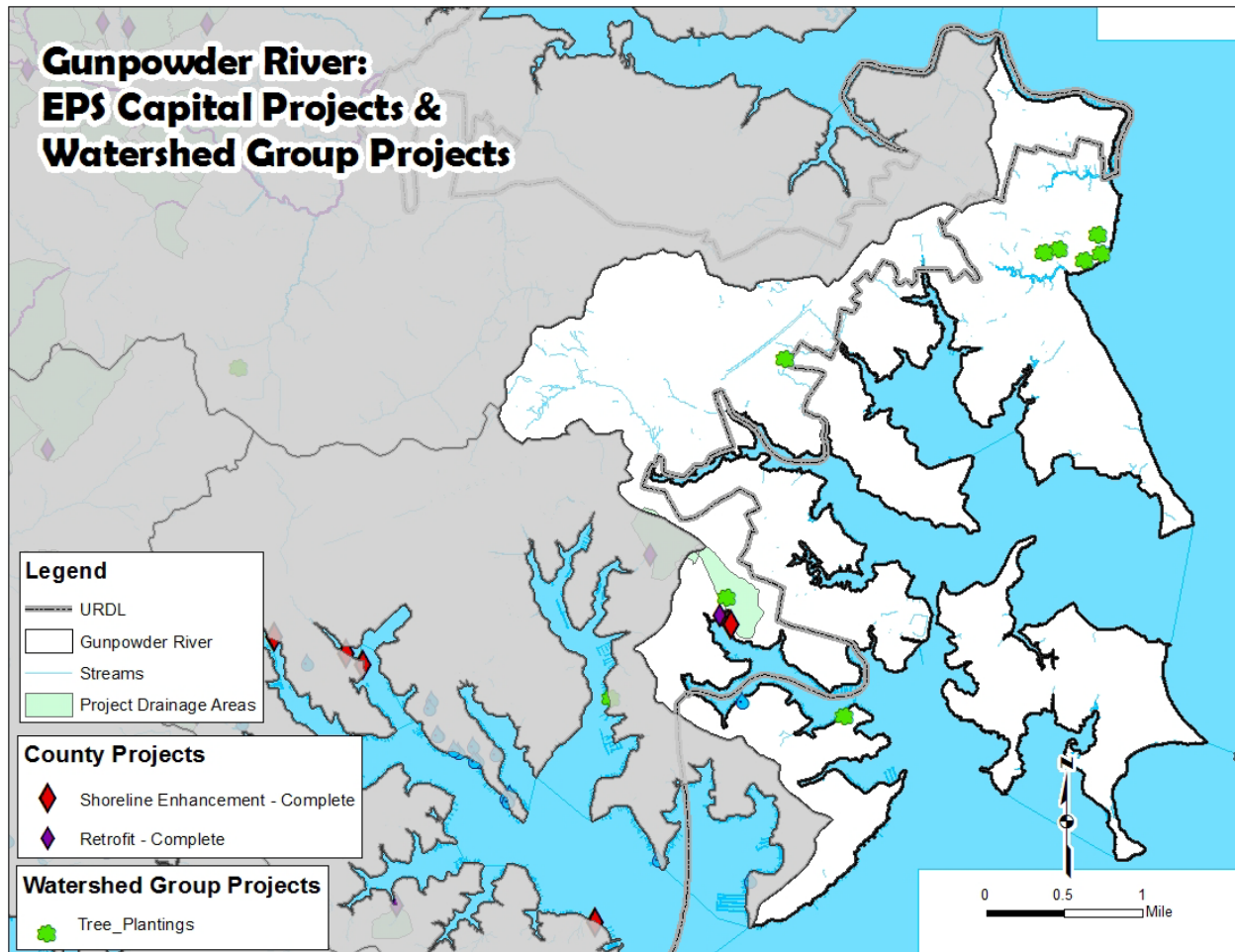


Figure 9-7: EPS Capital Projects and Watershed Group Projects in the Gunpowder River Watershed

9.4.8.9 Middle River Watershed

Capital Improvement projects completed by Baltimore County EPS in the Middle River watershed are shown below in Table 9-23. Figure 9-8 shows the locations of these projects and locations of watershed group projects.

Table 9-23: Middle River Watershed – CIP Status

Capital Improvement Projects Through FY13 Middle River Watershed								
Project	Facility Type	DA (ft)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Dark Head Park	SE	(780)	168,000	90	426.2	280.2	1,167,600	31.2
Rocky Point Beach	SE	(1,110)	324,945	93	1,319.7	867.7	3,615,600	44.4
Pottery Farm Park	SE	(1700)	351,000	95	190.5	125.3	521,914	68.0
Hawthorne Park	SE	(350)	64,000	95	39.1	25.7	107172	14.0
Norman Creek	STWET	25.2	131,151	95	35.0	5.5	3124.7	4.4
Turkey Point	SE	(1,000)	127,539	97	112.7	74.1	308,880	40.0
Sue Creek	STWET	21.9	93,274	97	32.9	6.5	3,814.40	6.7
Dark Head Park II (repair)	REP	na	15,094	99	na	na	na	na
Tall Trees	SR	(1,000)	1,100,000 combined	06	200.0	68.0	310,000	10.0
Tall Trees	RET	117.7		06	177.3	37.3	22,436.9	39.7
Frog Mortar	RET	66.1	82,000	08	95.4	18.4	10,865.1	19.1

TOTALS	230.9 (5,940)	2,457,003		2,451.5	1,471.4	5,793,220.0	277.5
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Abbreviations:

SR: Stream Restoration

RET: Retrofit

REP: Repair

SE: Shoreline Enhancement

STWET: Stormwater Wetland



9.4.9 Restoration Projects – Patapsco/Back River

There have been no capital restoration projects completed in the Liberty Reservoir watershed.

Capital Improvement projects completed by Baltimore County EPS in the Lower North Branch Patpasco watershed are shown in Table 9-24. Figure 9-9 shows the locations of these projects and locations of watershed group projects.

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Table 9-24: Patapsco River Watershed – CIP Status

Capital Improvement Projects Through FY13 Patapsco River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Bloomsbury (DPW)	RET	10.4	unknown	90	21.7	0.8	2,529.20	1.5
Herbert Run@ Selma Ave.	SR	(550)	227,000	00	110.0	37.4	170,500.0	5.5
Herbert Run @ Leeds Ave	SR	(300)	78,144	03	60.0	20.4	93,000.0	3.0
2203 Sulphur Spring Rd	SR	(200)	111,000	03	40.0	13.6	62,000.0	2.0
Halethorpe Streambank	SR	(100)	61,500	03	20.0	6.8	31,000.0	1.0
Bens Run SR	SR	(2,000)	570,964	04	400.0	136	620,000.0	20.0
Bens Run Retrofit	STWET	81.4		04	196.8	27.6	42,939.3	40.6
<i>Herbert Run @ Paradise Ave. – cd</i>	<i>SR</i>	<i>(1,000)</i>	<i>482,000</i>	<i>10</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>
TOTALS		91.8 (4,150)	1,530,608		848.5	242.6	1,021,968.5	73.6
Projects Under Design or Construction								
Catonsville Park Retrofit*	SR (& RET)	(2,100)	800,000					
Abbreviations SR: Stream Restoration STWET: Stormwater Wetland RET: Retrofit cd: Consent Decree requirement D: Design C: Construction * joint project w/DPW								

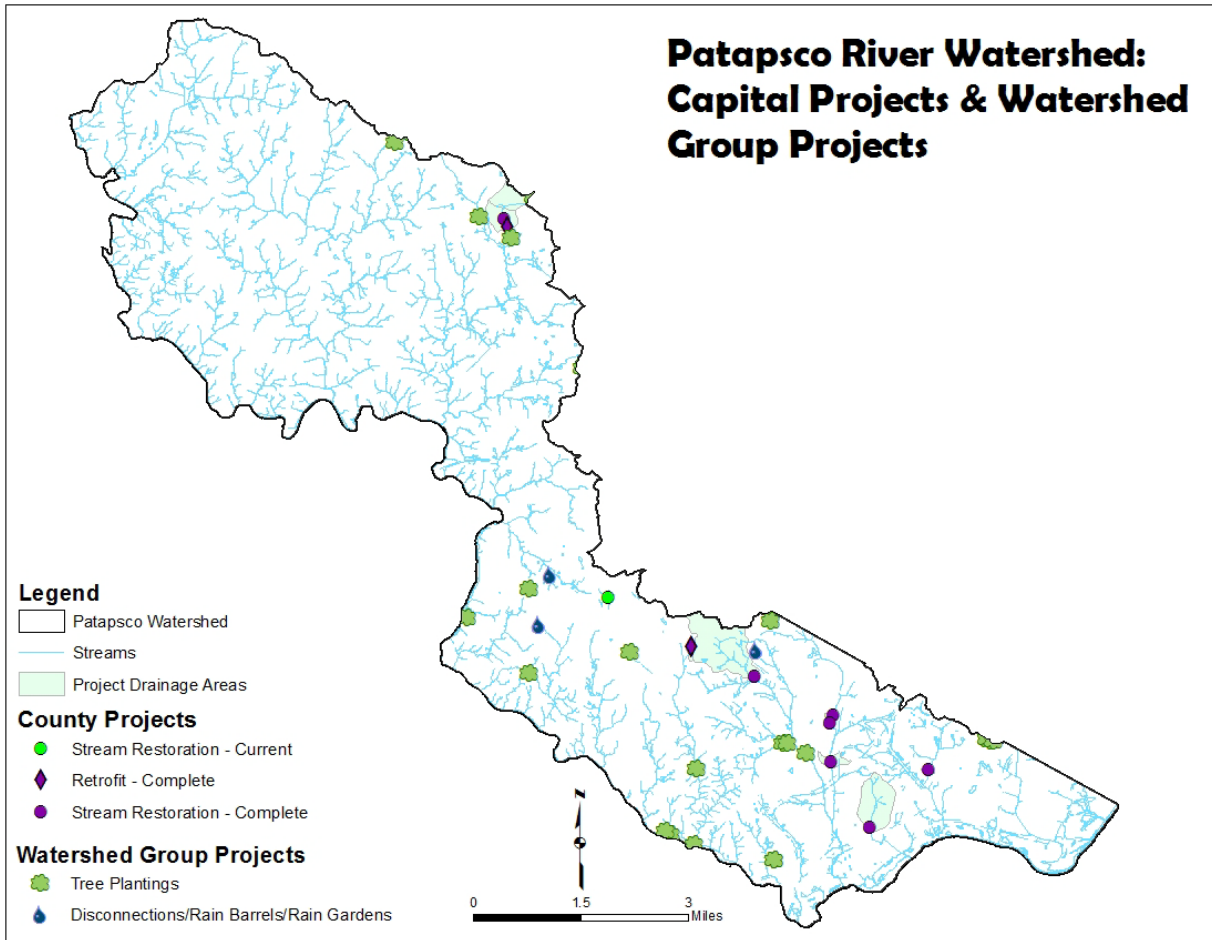


Figure 9-9: EPS Capital Projects and Watershed Group Projects in the Patapsco Watershed

9.4.9.3 *Gwynns Falls Watershed*

Capital Improvement projects completed by Baltimore County EPS in the Gwynns Falls watershed are shown in Table 9-25. Figure 9-10 shows the locations of these projects and locations of watershed group projects.

Table 9-25: CPO Projects in the Gwynns Falls Watershed

Capital Improvement Projects Through FY13 Gwynns Falls Watershed								
Project	Facility Type	DA (LF)	Cost	Year	Removal Rate (lb./year)			Impervious Acres
					TN	TP	TSS	
Completed Projects								
GF Trib @ Greenshire Ct	SR	(135)	17,690	99	27.0	9.2	41,850	1.4
Dead Run @ Security/McD	BE	(250)	23,690	02	na			
Rutherford Business Ctr.	CNV	46.2	134,000	03	138.7	21.2	37,076.8	23.2
Dead R@ HS Ftbridge/wall	SR	(200)	141,000	03	40.0	13.6	62,000	2.0
Woodlawn HS retrofit	RET/BE	10.4	206,000	03	101.2	5.9	7,958.9	0.01
Dead Run@ Whitehead 1	SCR	17.0	155,000	03	13.7	2.1	2,861.2	7.7
Dead Run@ Whitehead 2	SCR	7.0			5.5	0.8	1,116.8	5.2
DR @ Woodlawn Dr (Fox)	SR	(450)	232,594	04	90.0	30.6	139,500	4.5
GF @ Chartley SR	SR	(2,000)	970,000	06	400.0	136.0	620,000	20.0
Gwynns Falls @ Gwynnbrook – cd	SR	(2,500)	470,000	09	na			

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Upper Gwynns Falls 5 Facilities	CNV	168.2	1,055,000	13	440.2	47.0	75,903.1	44.7
TOTALS		228.5 (5,535)	3,407,699		1,256.3	266.5	988,266.7	108.7
Projects Under Design or Construction								
Scott's Level @ McDonogh	SR/RET	(1,125)	1,800,000					
Gwynns Falls @ Gwynnbrook Repair	REP	(250)	150,000					
DR @ West View Park	SR	(4,700)	1,475,310					
Gwynns Falls @ Chartley II	SR	(2,000)						
Abbreviations:								
CNV: SWM Pond Conversion			SCR: StormCeptor					
SR: Stream Restoration			HAB: Habitat improvement					
RET: Retrofit			BE: Buffer Enhancement					
cd: Consent Decree requirement			REP: Repair					

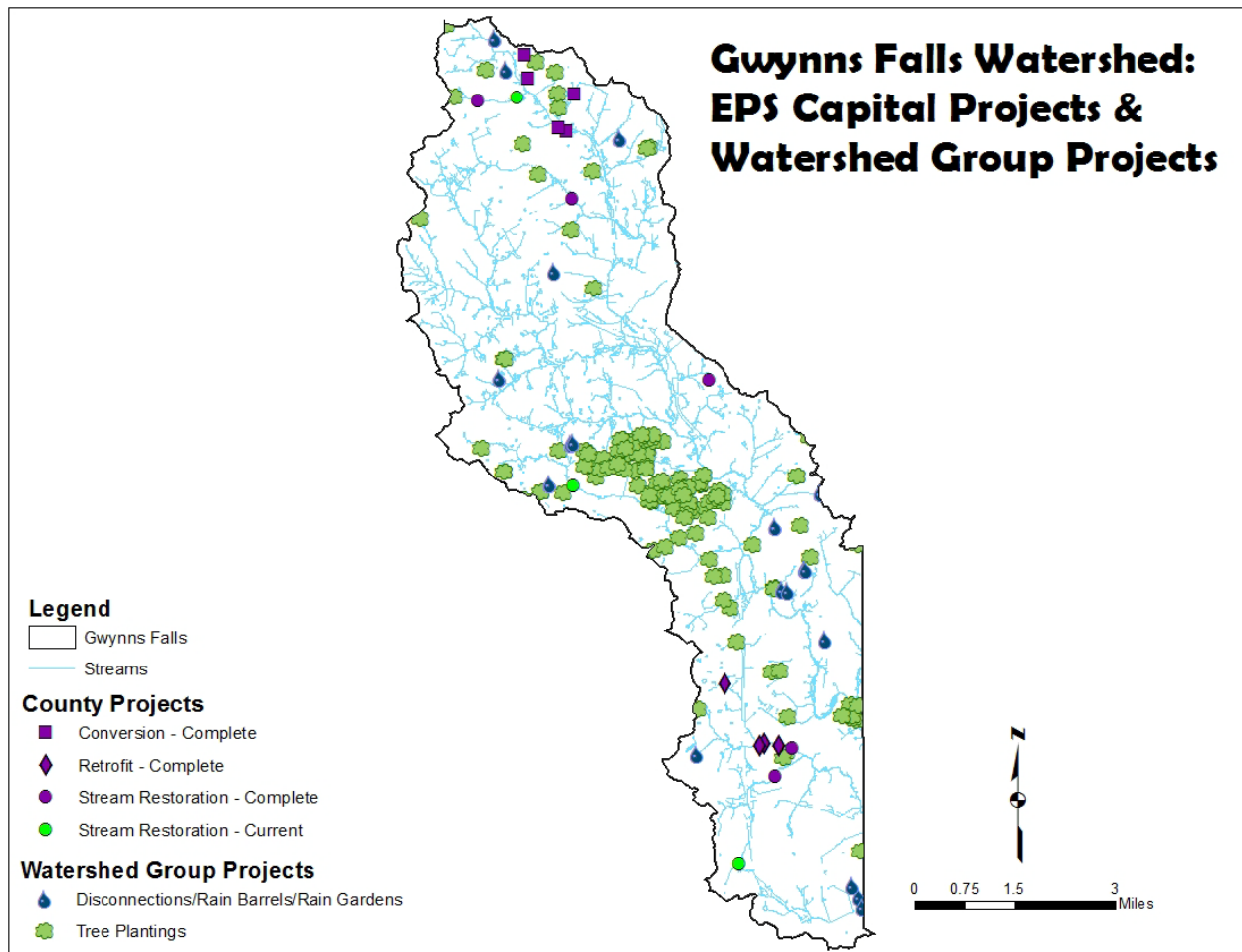


Figure 9-10: EPS Capital Projects and Watershed Group Projects in the Gwynns Falls Watershed

Section 9 – Watershed Planning, Restoration Progress, and Total Maximum Daily Loads**9.4.9.4 Jones Falls Watershed**

Capital Improvement projects completed by Baltimore County EPS in the Jones Falls watershed are shown in Table 9-26. Figure 9-11 shows the locations of these projects and locations of watershed group projects.

Table 9-26: Jones Falls Watershed – CIP Status

Capital Improvement Projects Through FY13 Jones Falls Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Lake Roland Ag BMPs	SR	(1500)	45,000	95	300.0	102.0	465,000.0	15.0
Moore’s Branch @ Ltfoot	SR	(100)	25,000	96	20.0	6.8	31,000.0	1.0
Robin Hood Cr. minor outf	RET	12.5	307,359	98	9.6	1.0	569.5	2.6
Kenilworth Park	RET	77.7		98	92.0	13.4	8369.9	40.6
Orchard Hills outfall #149	RET	86.9		98	55.9	5.3	3018.4	21.8
Rol. Run - Essex farm Rd.	SR	(250)		98	50.0	17.0	77,500.0	2.5
Roland Run – Sem. Ave.	SR	(150)	479,488	98	30.0	10.2	46,500.0	1.5
Towson Run – VFW Hall	SR	(600)		00	120.0	40.8	186,000.0	6.0
Roland Run – Jeffers Rd.	SR	(1,550)	451,083	02	310.0	105.4	480,500.0	15.5
Wood Valley	SR	(2,000)	1,077,510	04	400.0	136.0	620,000.0	20.0
Roland Run-Riderwd. Hills	SR	(2,400)	1,100,000	07	480.0	163.2	744,000.0	24.0
Roland Run @ Kellogg	SR	(1,500)	823,642	12	300.0	102.0	465,000	15.0
TOTALS		177.1 (10,050)	4,658,951		2,167.4	703.1	3,127,457.8	165.5
Projects Under Design or Construction								
Rol Run @Gspring	SR/RET	(3,500)	2,887,000					
Twsn Run @ Clsters	SR	(3,000)	1,558,401					
Abbreviations SR: Stream Restoration DET: Detention Pond RET:Retrofit								

Jones Falls Watershed: Capital Projects & Watershed Group Projects

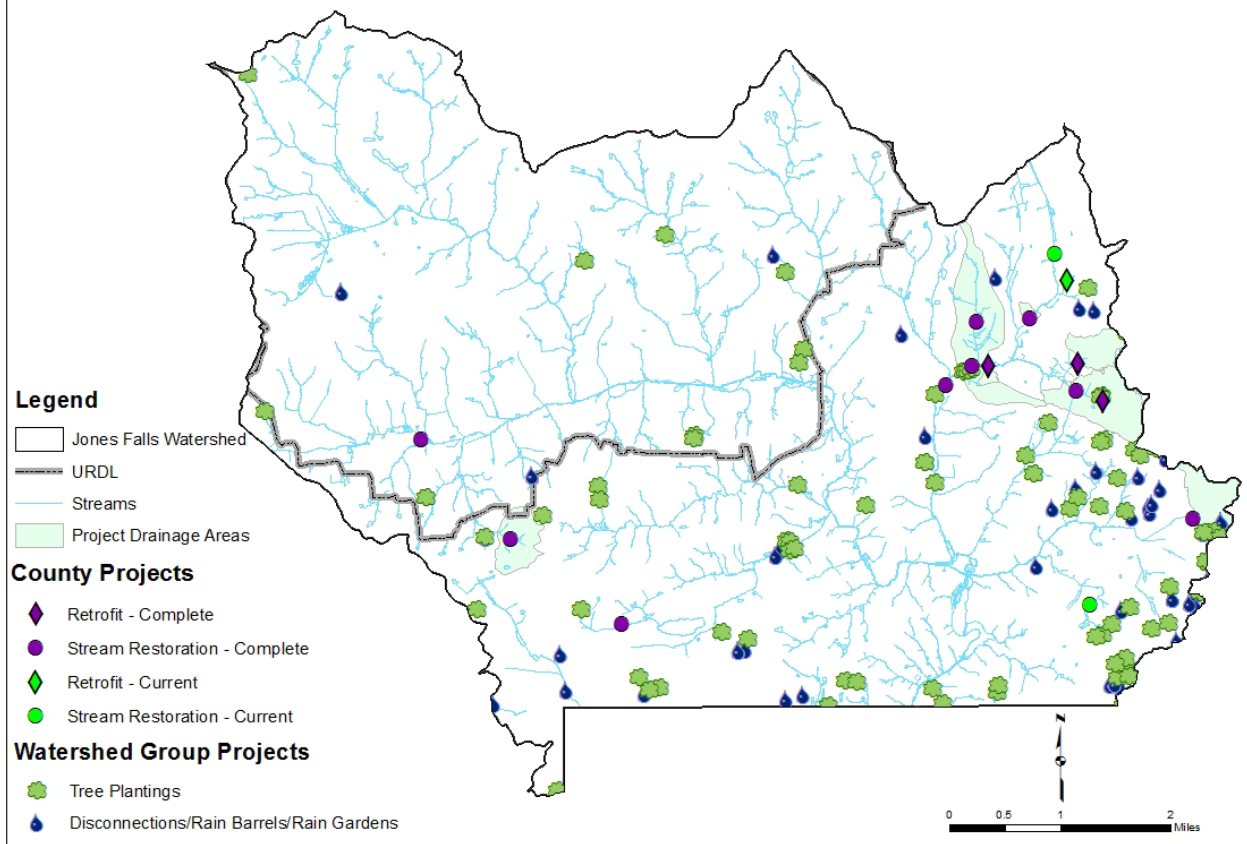


Figure 9-11: EPS Capital Projects and Watershed Group Projects in the Jones Falls Watershed

9.4.9.5 *Back River Watershed*

Capital Improvement projects completed by Baltimore County EPS in the Back River watershed are shown below in Table 9-27. Figure 9-12 shows the locations of these projects and locations of watershed group projects.

Table 9-27: CPO Projects in the Back River Watershed

Capital Improvement Projects Through FY13 Back River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Coxs Point I	SE	(220)	45,000	91	113.5	74.6	311,200	8.8
Rocky Point Long Creek	SE	(1,370)	151,667	94	407.2	267.7	1,115,618	54.8
Coxs Point II	SE	(1,950)	295,000	95	1,388.2	912.8	3,803,352	78.0
Lynch Point Cove – SM	RET	36.2	250,000	95	48.7	9.8	4,615.1	10.9
Rocky Point @ Ballestone	SE	(2,000)	389,480	97	290.1	190.8	794,851	80.0
Stemmers Run@ Dbl Rock	SR	(1,881)	362,905	97	376.2	127.9	583,110	18.8
Stemmers Run VFW SWM #2240	SCR	15.7	121,000	98	unk	unk	unk	unk
Stemmers Run Garnet SWM #2241	SCR	12.0						
Stemmers Run BIO	RET	unk						

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Capital Improvement Projects Through FY13 Back River Watershed								
Project	Facility Type	DA (LF)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Redhouse E.S. Retrofit	RET	53.4	136,794	98	72.8	12.8	5,810.6	12.0
Greenhill WQ Retrofit	SCR	10.4	35,273	98	4.1	0.8	303.9	4.6
Redhouse Run Md-7	SCR	2.5	49,925	99	1.1	0.3	111.1	1.9
Briens Run @ Rossville Industrial Park	CNV	151.7	184,210	99	230.5	53.9	25,789.8	65.0
Herring Run (Wiltondale)	SR	(1,400)	295,860	99	280.0	95.2	434,000	14.0
Hart Miller Island	SE	(3,000)	338,000	99	353.0	232.1	967,075	120.0
Herring Run (Goucher)	SR	(300)	158,538	00	60.0	20.4	93,000	3.0
Redhouse Run @ Overlea Trib C	SR	(2,600)	529,260	01	520.0	176.8	806,000	26.0
Linover Park	SR	(1,000)	206,745	02	200.0	68.0	310,000	10.0
Rocky Pt. Habitat Creation	HAB	(690)	519,505	02	78.0	51.3	213,670	27.6
BR @ Martin Blvd Interchange	NEXT	208.7	629,144	04	335.1	120.3	80,213.1	65.1
Linwood Avenue	SR	(500)	283,968	04	100.0	34.0	155,000	5.0
Glenwest	SR	(500)	203,220	04	100.0	34.0	155,000	5.0
Golden Tree Sec I	CNV	23.0	Dev paid	04	33.8	2.9	3,032.9	6.8
Golden Tree Sec III	CNV	15.7	Dev paid	04	22.7	1.9	1,920.4	4.1
Herring Run Bank Sta @ Weatherbee	SR	(100)	30,000	07	20.0	6.8	31,000	1.0
Herring Run @ Sussex Rd.	Srepair	na	96,572	07	na	na	na	
BR Trash Boom	TRA	na	80,000	10	na	na	na	
Her Run @Collinsdale-cd	SR	(2,000)	661,395	10	na	na	na	
Rdhse Rn@ St. Pat Rd	SR	(2,000)	943,361	11	400.0	136.0	620,000	20.0
BR Trash Boom Maintenance	TRA	na	70,000	11	na	na	na	
Essex Skypark	SE	(2,610)	1,267,588	12	764	503	2,094,420	104.4
BR Trash Boom Maintenance	TRA	na	70,000	12	na	na	na	
SWAP SWM Conv (4 Ponds)	CNV	100.6	96,000	13	310.6	46.5	22,041.0	41.1
BR Trash Boom Maintenance	TRA	na	88,100	13	na	na	na	
TOTALS		529.1 (24,221.6)	8,588,510		6,218.8	2,845.3	11,341,198.8	787.9
Projects Under Design or Construction								
Tidal Back River Greening	multiple		1,207,388		131.7	11.9	4,174.9	
HR @ Overlook	SR	(9,000)	3,500,000		1800	612	2,790,000	
Bread & Ch	SR	(1,523)	1,000,000		320	108.8	496,000	
Abbreviations CNV: SWM Pond Conversion ENH: Enhancement TRA: Trash Removal NWET: New Wet Pond SCR: StormCeptor RET: Retrofit SR: Stream Restoration SE: Shoreline Enhancement HAB: Habitat improvement <i>cd-consent decree</i> TP: Tree Planting								

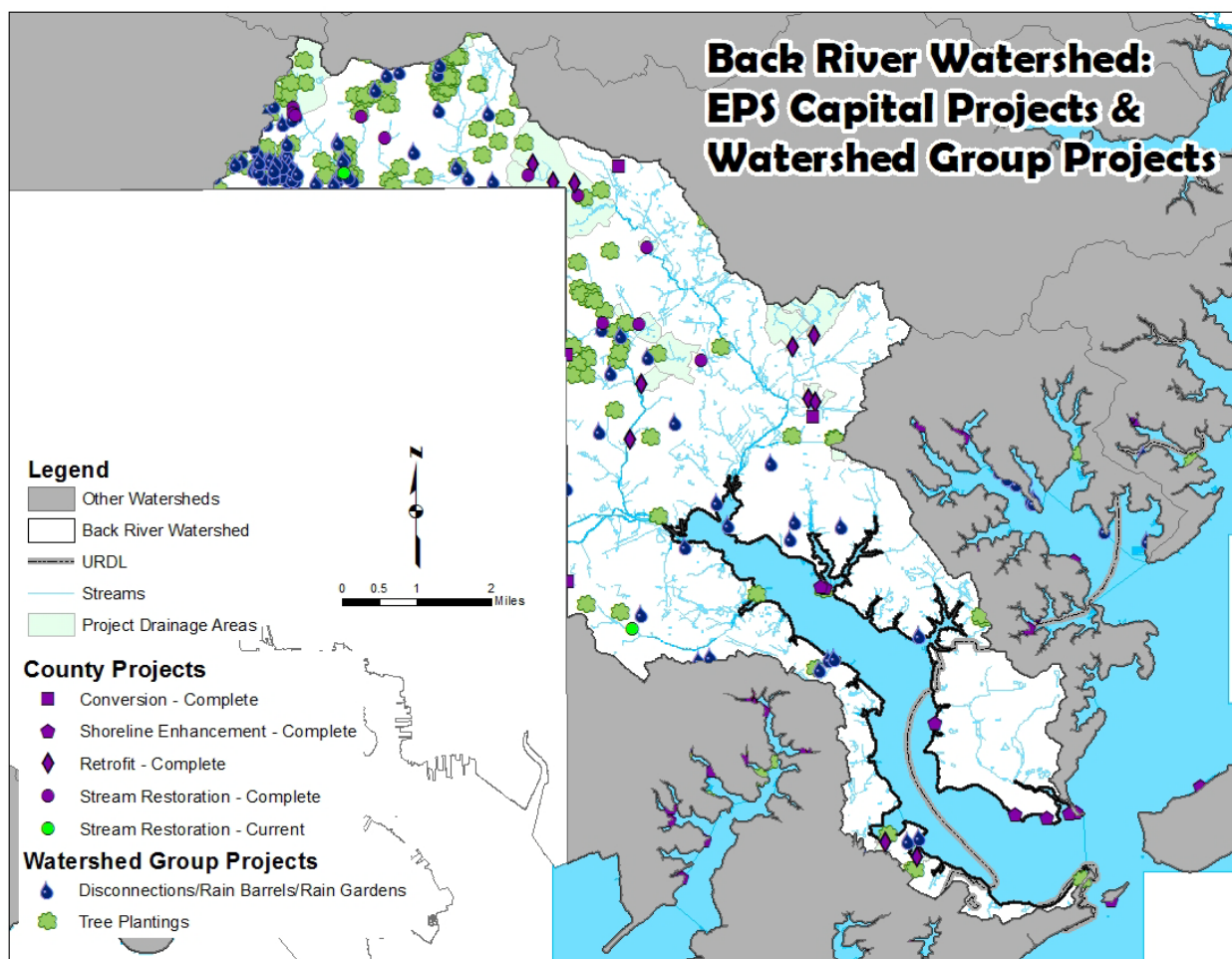


Figure 9-12: EPS Capital Projects and Watershed Group Projects in the Back River Watershed

9.4.9.6 *Baltimore Harbor Watershed*

Capital Improvement projects completed by Baltimore County EPS in the Baltimore Harbor watershed are shown in Table 9-28. Figure 9-13 shows the locations of these projects and locations of watershed group projects.

Table 9-28: CPO Projects in the Baltimore Harbor Watershed

Capital Improvement Projects Through FY13 Baltimore Harbor Watershed								
Project	Facility Type	DA (ft.)	Cost	Date	Removal Rate (lb./year)			Imp Acres
					TN	TP	TSS	
Completed Projects								
Concrete Homes	SE	(430)	65,000	90	133.4	87.7	365,452	17.2
Watersedge Park	SE	(480)	92,000	90	72.8	47.9	199,400	19.2
Merritt Point Park	SE	(1880)	175,000	90	128.5	84.5	352,000	75.2
Bear Creek I	SE	(475)	66,000	90	112.6	74.1	308,599	19.0
West Inverness	SE	(230)	19,000	90	14.1	9.3	38,800	9.2
Geise Ave.	SCR	1.8	unk	89	0.7	0.2	76.8	0.7
Chink Creek	RET	12.6	unk	90	18.6	3.7	2,048.0	3.7
Hughes Ave	SCR	17.6	unk	90	6.8	1.3	528.6	5.6

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Charlesmont Park	SE	(750)	47,000	93	76.9	50.5	210,600	30.0
Sandy Plains Elem.	SE	(380)	108,000	98	82.7	54.4	226,568	15.2
Tabasco Cove	STWET	161.3	128,209	96	233.9	64.5	38,570.2	77.7
Battle Grove Park	SE	(420)	82,000	95	153.2	100.8	419,852	16.8
North Point Creek	NEXT	73.3	117,277	98	105.6	19.0	10,360.0	17.4
Schoolhouse Cove 8 SCR's	SCR	70.5	419,133	98				37.4
Bear Creek II Shore	SE	(700)	138,558	99	83.2	54.7	228,010	28.0
Bear Creek II SD Retrofit	NWET	11.0	93,026	99	17.2	4.0	2,288.4	4.7
Watersedge Park II (repair)	SE	(90)	21,062	99	na	na	na	
Lynch Cove Retrofit site-I	STWET	240.0	500,000 combined	03	90.9	17.2	7,291.6	86.0
Lynch Cove Retrofit site-II	STWET	188.9		03	188.9	45.5	26,348.6	55.5
Fleming Park	SE	(1,767)	540,303	07	25.6	16.9	70,228	70.7
Pleasure Island	SE	(3,100)	4,200,000	11	407.3	267.8	1,116,000	124.0
Schoolhouse Cove SCR & RET	SCR/ STWET	6.8	146,000	11	10.5	2.3	1,314.9	2.6
TOTALS		783.8 (10,702.0)	6,957,568		1,963.4	1,006.3	3,624,336.1	715.8
Projects Under Design or Construction								
Stansbury Park (Rec and Parks Project)	SE	(300)		13				
Abbreviations CNV: SWM Pond Conversion NWET: New Wet Pond SR: Stream Restoration STWET: Stormwater Wetland NEXT: New Extended Detention Pond SCR: StormCeptor SE: Shoreline Enhancement								

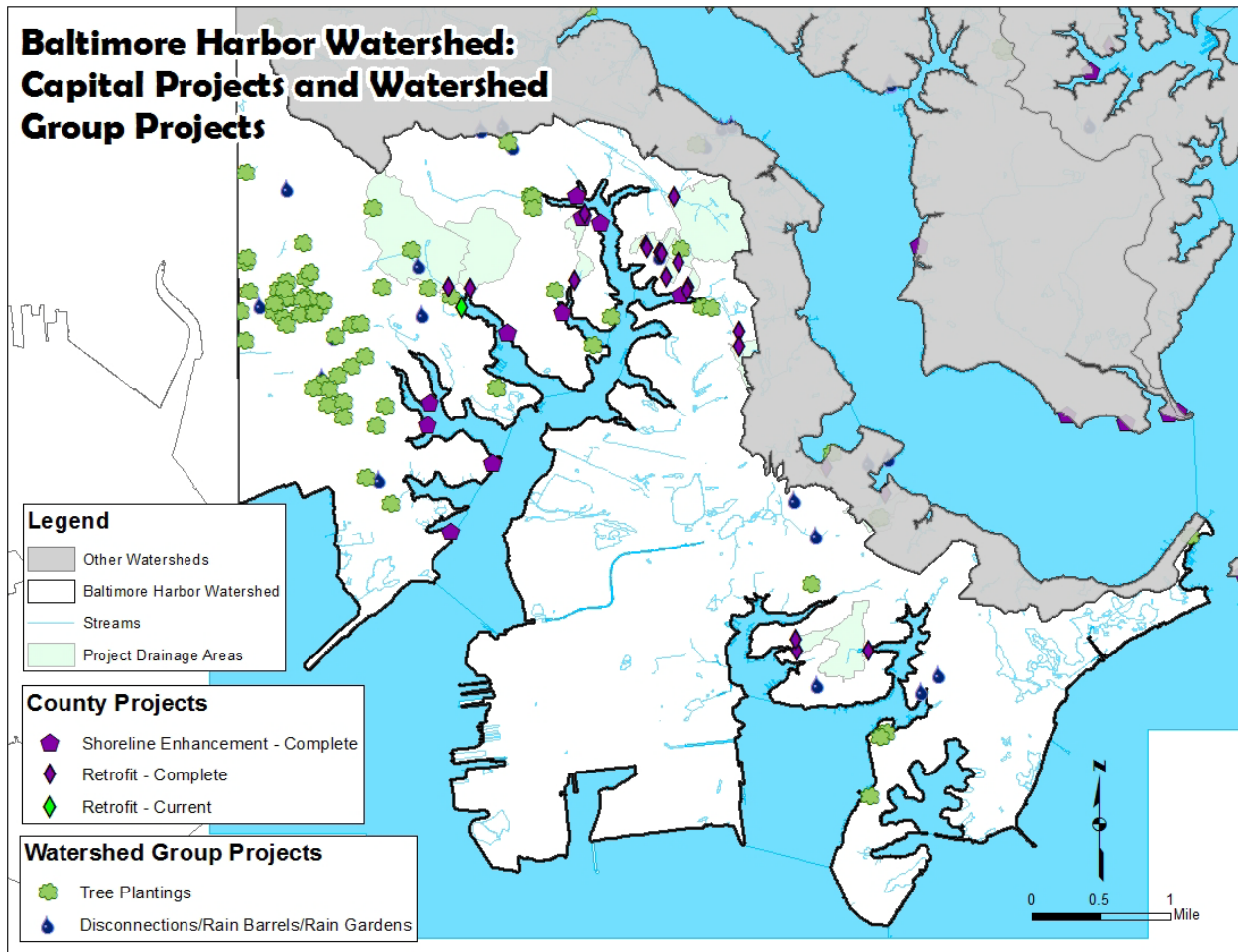


Figure 9-13 EPS Capital Projects and Watershed Group Projects in the Baltimore Harbor Watershed

9.4.10 *Redevelopment/Revitalization Pollutant Load Reductions*

A process has been developed for tracking redevelopment/revitalization projects and the calculation of the pollutant load reductions due to these projects. The process will need refinement over the next year, as the current process is somewhat cumbersome. Redevelopment is defined as a pre-development site impervious cover >40% as per the stormwater management regulations. Revitalization is defined as pre-development impervious cover that ranges from 20% to 40%. Both redevelopment and revitalization projects are already accounted for in the Chesapeake Bay Watershed Model as urban land, and therefore included in the load reduction allocation for Baltimore County. The tracking process was set up relatively late and therefore only a portion of the redevelopment/revitalization projects are accounted for. For the identified projects pollutant load calculations were performed to calculate the pre-development load and the post development load, using the watershed specific Edge-of-Stream loading rates and the efficiencies of the various Best Management Practices. The differential between the pre-development load and the post-development load is then calculated to determine the pollutant load reduction on a project by project basis. The pre and post impervious cover is also calculated. Table 9-29 provides information on the 11 redevelopment/revitalization projects that have completed calculations.

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Table 9-29: Pollutant Load Reduction as a Result of Redevelopment/Revitalization Projects

Project Name	Pre-development			Type*	Post Development Impervious	Pollutant Load Change		
	Site Acres	Impervious Acres	% Impervious			N	P	TSS
Towson Manor	17.72	4.49	25.3	Rev	8.83	-50.0	-1.9	-2,198.3
Towson Square	4.56	3.4	74.5	Red	3.89	-13.5	-1.3	-1,140.9
Metro Center – North	13.79	9.42	68.3	Red	9.42	-50.5	-5.8	-10,608.9
Metro Center – South	30.16	24.69	81.9	Red	24.69	-196.7	-23.4	-42,618.1
Eastern Automotive Group	2.16	1.42	65.7	Red	0.98	-2.6	-0.5	-798.6
1400 Taylor Avenue PUD	17.17	8.02	46.7	Red	14.12	-27.2	-3.5	-2,516.5
Catholic Charities Senior Housing	7.39	3.12	42.2	Red	3.03	-10.4	-2.0	-947.5
Galloway Creek PUD	3.89	3.03	77.9	Red	0.96	-6.7	-2.5	-1,280.1
Shelter Harbor PUD	5.54	4.53	81.8	Red	4.22	-1.7	-1.0	-588.8
The Greens at Logan Field	3.07	3.02	98.4	Red	1.8	-3.0	-1.7	-877.8
The Townes at North Point	16.29	12.68	77.8	Red	12.19	-36.8	-7.8	-4,643.2
Totals	121.74	77.82			84.13	-399.3	-51.4	-68,215.6

- Red = Redevelopment, Rev = Revitalization

Most of the projects tracked so far fall into the redevelopment category with only one of the eleven projects falling into the revitalization category. While there was an increase of 6.3 acres of impervious cover for the projects, nitrogen was reduced by ~400 pounds, phosphorus by ~51 pounds, and sediment by ~34.1 tons. In addition, to the calculated reductions the implementation of redevelopment/revitalization projects reduces pressure on green field development.

9.5 Progress in Meeting Impervious Surface Restoration Requirements

Using the guidance in *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* (MDE, June 2011), the amount of impervious cover that needs to be addressed in Baltimore County was calculated. The County will submit a final report in the impervious cover calculations to MDE prior to the next annual report to review and approval. The impervious calculations in this report should be considered tentative until approval of the calculations is obtained from MDE. In order to assure consistency between MS4 regulated jurisdictions MDE has determined that the base year of 2002 impervious cover be used to determine how many acres of impervious cover will need to be addressed. The implementation of the MDE 2000 Stormwater Design Manual was initiated in 2002 by local jurisdictions. The revised Design Manual required management of the 1st inch of runoff for quantity control and included groundwater recharge volume and water quality volume reductions. Chapter 5 of the manual included many Environmental Site Design (ESD) practices that are now required for new development and redevelopment projects. MDE considers that any approvals of stormwater plans for development approved in 2002 and thereafter will meet the highest required stormwater management requirements.

Baltimore County does not have an impervious surface coverage for 2002. In order to determine the amount of impervious surface coverage in 2002, the County had to extrapolate between two periods for which it did have impervious coverage. The two years for which the county does have impervious cover are 1997 and 2005. The impervious surfaces are based on planimetric

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data and include two data layers, a building data layer and a roads data layer. The building data layer does not include sidewalks. The roads data layer includes parking lots but only driveways longer than 200 feet.

Baltimore County is not responsible for impervious surfaces managed by the State of Maryland, federal facilities, Baltimore City, or industrial facilities regulated under the General Industrial Stormwater Permit (except for those county facilities that fall within one of the regulated industrial categories, see Section 7). In addition, the agricultural sector does not fall under the requirements of the NPDES – MS4 Permit Program. It was necessary to determine the amount of impervious controlled by each sector listed above and subtract that amount of impervious cover from the total impervious cover in the county. The detail of the calculations will be described in the Baltimore County Impervious Cover Analysis that will be submitted to MDE once the final quality assurance/quality control is completed and the Baltimore County NPDES – MS4 permit is re-issued. The results of the analysis are presented in Table 9-30

Table 9-30: Baltimore County Impervious Area by Watershed – Calculated for 2002

Watershed	Total Imp. Cover	State Imp. Cover	Federal Imp. Cover	City Imp. Cover	Ind. – SW reg. Imp. Cover	Ag Imp. Cover	SWM Imp. Cover	County Imp. Cover
Upper Western Shore Watersheds								
Deer Creek	183.6	24.5	0.0	0.0	0.0	50.6	0.0	104.5
Prettyboy Reservoir	504.0	25.6	0.0	25.1	0.0	115.8	5.6	327.6
Loch Raven Reservoir	6,856.4	656.3	5.2	60.1	41.1	567.1	641.8	4,904.7
Lower Gunpowder Falls	2,330.8	214.8	0.0	0.4	0.4	127.0	249.0	1,732.3
Little Gunpowder Falls	663.5	94.8	0.0	0.0	0.0	90.4	30.1	444.8
Bird River	2,569.9	289.1	3.5	0.0	30.5	11.0	534.9	1,718.3
Gunpowder River	402.6	25.1	16.3	0.0	2.1	6.3	30.3	323.7
Middle River	1,399.9	295.3	1.9	0.0	6.1	6.2	97.2	987.7
Upper Western Shore Totals	14,910.7	1,625.5	26.9	85.6	80.2	974.4	1,588.9	10,543.6
Patapsco/Back River Watersheds								
Liberty Reservoir	660.7	126.9	0.2	19.6	0.0	48.1	24.4	438.9
Patapsco River	4,405.8	740.7	18.8	0.3	38.3	41.6	372.9	3,230.0
Gwynns Falls	6,675.7	708.5	104.8	0.0	77.2	7.6	1,180.2	4,673.2
Jones Falls	3,749.1	497.4	0.1	3.9	0.0	22.4	355.1	2,869.2
Back River	5,625.0	598.8	3.3	89.0	63.7	8.0	210.9	4,713.8
Baltimore Harbor	3,067.8	476.6	17.7	0.0	217.8	4.1	55.9	2,514.1
Patapsco/Back River Totals	24,184.1	3148.9	144.9	112.8	397	131.8	2,199.4	18,439.2
County-Wide Totals	39,083.7	4,783.3	171.7	198.2	477.3	1,106.2	3,788.0	28,982.8
% of Total Imp. Cover		12.2%	0.4%	0.5%	1.2%	2.8%	9.7%	74.2%

To meet the current NPDES permit requirement Baltimore County must provide restoration for impervious land areas that are equal to or greater than 20% of the County's urban impervious cover. Twenty percent of 28,982.8 acres is 5,796.6 acres. An additional 5,796.6 acres of impervious cover will have to be addressed during the next term of the permit once the permit is renewed.

Using the guidance provided by *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* (MDE, June 2011) the impervious area treated was calculated for each restoration program. The results are presented in Table 9-31 for progress made through 2010,

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along with the pound of nitrogen, phosphorus and sediment reduced, by watershed, by restoration program. The same information is presented in Table 9-32 for the time period of January 1, 2011 through June 30, 2012, and in Table 9-33 for fiscal year 2013 (July 1, 2012 – June 30, 2013). Note that in Table 9-32 and P-33 street sweeping and inlet cleaning are included. These programs must be implemented annually to receive credit, while the other programs are cumulative. Only the fiscal year 2013 progress for street sweeping and inlet cleaning will be included in the progress to date.

Table 9-31: Progress Made in Pollutant Load Reductions and Impervious Area Treated Through 2010

Deer Creek Watershed Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	0.0	0.0	0.0	0.0
Growing Home Campaign	4.0	0.1	68.3	0.2
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	0.0	0.0	0.0	0.0
BC Rain Barrel Sale	0.0	0.0	0.0	0.0
Restoration Progress through 2010	177	7.3	4926.3	6.2
Prettyboy Watershed Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	0	0	0	0
Growing Home Campaign	4.0	0.1	68.3	0.2
EPS Community Reforestation Program	120.7	5.0	3272.6	4.4
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	51.6	2.2	1536.9	1.6
EPS Big Tree Sale	0.4	0.0	6.0	0.0
BC Rain Barrel Sale	0.3	0.0	42.5	0.0
Restoration Progress through 2010	177	7.3	4926.3	6.2
Loch Raven Watershed Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	4,973.60	1,581.4	6,977,458.0	301.90
Growing Home Campaign	85.5	2.6	1520.5	3.7
EPS Community Reforestation Program	279.6	10.7	7320.1	10.7
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	755.5	28.9	19,943.8	25.1
EPS Big Tree Sale	14.4	0.5	256.3	0.2
BC Rain Barrel Sale	1.7	0.2	289.6	0.3
Restoration Progress through 2010	6,110.3	1,624.3	7,006,788.3	341.9

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Table 9-31: Progress Made in Pollutant Load Reductions and Impervious Area Treated Through 2010 (continued)

Lower Gunpowder Falls Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	3,796.4	1,290.8	5,884,420.0	190.0
Growing Home Campaign	31.8	0.9	723.9	1.4
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	204.4	9.4	9,044.0	6.5
EPS Big Tree Sale	1.1	0.1	24.6	0.1
BC Rain Barrel Sale	3.1	0.4	623.5	0.3
Restoration Progress through 2010	4,036.8	1,301.6	5,894,836	198.3
Bird River Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	5,797.2	1,857.1	7,971,443.0	367.8
Growing Home Campaign	13.5	0.7	178.4	1.1
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	0.1	0.0	6.5	0.0
EPS Big Tree Sale	0.0	0.0	0.0	0.0
BC Rain Barrel Sale	2.3	0.4	260.7	0.5
Restoration Progress through 2010	5,813.1	1,858.2	7,971,888.6	369.4
Gunpowder River Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	114.2	32.1	67,953.9	25.2
Growing Home Campaign	3.6	0.2	57.2	0.3
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	0.0	0.0	0.0	0.0
BC Rain Barrel Sale	0.1	0.0	11.9	0.1
Restoration Progress through 2010	117.9	32.3	68,023	25.6

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Table 9-31: Progress Made in Pollutant Load Reductions and Impervious Area Treated Through 2010 (continued)

Middle River Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	2,628.8	1,508.7	6,071,407.1	683.4
Growing Home Campaign	10.0	0.5	146.4	0.8
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	0.0	0.0	0.0	0.0
BC Rain Barrel Sale	0.3	0.1	37.0	0.1
Restoration Progress through 2010	2,639.1	1,509.3	6,071,590.5	684.3
Lower North Branch Patapsco River Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	848.5	242.6	1,021,968.5	83.6
Growing Home Campaign	18.5	0.5	320.4	1.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	27.9	5.8	6115.8	1.4
EPS Big Tree Sale	0.6	0.1	10.8	0.0
BC Rain Barrel Sale	1.4	0.2	272.2	0.2
Restoration Progress through 2010	896.9	249.2	1,028,687.7	86.2
Gwynns Falls Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	816.1	219.4	912,363.7	79.8
Growing Home Campaign	19.2	0.6	430.8	0.8
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	53.2	2.2	1,790.7	1.9
EPS Big Tree Sale	2.4	0.0	332.7	0.0
BC Rain Barrel Sale	1.6	0.2	350.6	0.2
Restoration Progress through 2010	892.5	222.4	915,268.5	82.7

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Table 9-31: Progress Made in Pollutant Load Reductions and Impervious Area Treated Through 2010 (continued)

Jones Falls Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	1,867.4	601.1	2,662,457.8	150.5
Growing Home Campaign	39.5	1.1	464.9	1.7
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	252.2	13.6	7,732.9	12.6
EPS Big Tree Sale	0.3	0.0	3.1	0.0
BC Rain Barrel Sale	1.6	0.2	155.1	0.2
Restoration Progress through 2010	2,161	616	2,670,813.8	165
Back River Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	5,254.3	2,438.2	9,812,370.0	727.7
Growing Home Campaign	23.0	1.1	247.4	1.8
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	61.8	4.2	1,236.8	4.9
EPS Big Tree Sale	0.0	0.0	0.0	0.0
BC Rain Barrel Sale	3.8	0.7	398.4	0.8
Restoration Progress through 2010	5,342.9	2,444.2	9,814,252.6	735.2
Baltimore Harbor Through 2010				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
All CPO Projects	1,545.6	736.2	2,507,021.2	589.2
Growing Home Campaign	4.4	0.2	55.1	0.3
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	0.0	0.0	0.0	0.0
BC Rain Barrel Sale	0.8	0.2	97.7	0.2
Restoration Progress through 2010	1,550.8	736.6	2,507,174	589.7

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Table 9-32: Progress Made in Pollutant Load Reductions and Impervious Area Treated January 2011 through June 30, 2012

Restoration In Prettyboy Watershed 2011 – FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	0.4	0.0	5.9	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.0	0.0	0.0	0.0
Watershed Association Projects	123.2	5.4	3,656.2	3.8
EPS Big Tree Sale	2.6	0.1	44.5	0.1
BC Rain Barrel Sale	0.6	0.06	102.0	0.1
Street Sweeping	0.0	0.0	0.0	0.0
Inlet Cleaning	0.0	0.0	0.0	0.0
Total 2011 – June 30, 2012	126.8	5.56	3,808.6	4.0
Restoration in the Loch Raven Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	8.4	0.2	150.0	0.4
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	3.8	0.1	67.2	0.2
Watershed Association Projects	153.68	6.07	4,245.5	5.4
EPS Big Tree Sale	15.1	0.4	268.8	0.7
BC Rain Barrel Sale	15.19	1.59	2,523.04	1.75
Street Sweeping	178.5	71.4	237,958.0	82.9
Inlet Cleaning	78.1	30.2	43,121.0	20.0
Total 2011 – June 30, 2012	452.77	109.96	288,333.54	111.35
Restoration in the Lower Gunpowder Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	2.7	0.1	17.8	0.1
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	5.6	0.2	121.2	0.2
Watershed Association Projects	60.81	2.72	2,594.28	1.95
EPS Big Tree Sale	1.1	0.0	22.7	0.0
BC Rain Barrel Sale	10.91	1.14	2,202.32	1.26
Street Sweeping	99.3	39.7	132,428.8	46.2
Inlet Cleaning	44.3	17.2	24,477.0	11.4
Total 2011 – June 30, 2012	224.72	61.06	161,864.1	61.11

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Table 9-32: Progress Made in Pollutant Load Reductions and Impervious Area Treated January 2011 through June 30, 2012 (continued)

Restoration in the Bird River Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	1.9	0.1	25.1	0.1
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.9	0.0	12.2	0.1
Watershed Association Projects	0	0	0	0
EPS Big Tree Sale	1.5	0.1	19.3	0.1
BC Rain Barrel Sale	3.15	0.58	371.58	0.65
Street Sweeping	91.6	36.6	122,082.8	42.5
Inlet Cleaning	33.9	13.2	18,694.0	8.7
Total 2011 – June 30, 2012	132.95	50.58	141,204.98	52.15
Restoration in the Gunpowder River Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	1.0	0.0	15.4	0.1
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.8	0.0	12.9	0.1
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	0.0	0.0	0.0	0.0
BC Rain Barrel Sale	0.64	0.12	91.08	0.13
Street Sweeping	9.3	3.8	12,415.2	4.3
Inlet Cleaning	12.9	5.0	7,113.0	3.3
Total 2011 – June 30, 2012	24.64	8.92	19,647.58	7.93
All Restoration in the Middle River Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	1.2	0.1	17.8	0.1
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	0.8	0.0	11.4	0.1
Watershed Association Projects	0.19	0.04	25.90	0.04
EPS Big Tree Sale	0.1	0.0	2.1	0.0
BC Rain Barrel Sale	1.13	0.21	151.68	0.24
Street Sweeping	34.2	13.7	45,522.4	15.9
Inlet Cleaning	29.4	11.4	16,205.0	7.6
Total 2011 – June 30, 2012	67.02	25.45	61,936.28	23.98

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Table 9-32: Progress Made in Pollutant Load Reductions and Impervious Area Treated January 2011 through June 30, 2012 (continued)

All Restoration in the Lower North Branch Patapsco Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	2.2	0.1	37.2	0.1
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	15.4	0.5	265.5	0.8
Watershed Association Projects	6.45	1.84	1955.93	0.24
EPS Big Tree Sale	1.1	0.0	19.2	0.1
BC Rain Barrel Sale	5.57	0.58	1072.66	0.77
Street Sweeping	214.1	85.7	285,549.6	99.5
Inlet Cleaning	114.0	44.2	62,949.0	32.4
Total 2011 – June 30, 2012	358.82	132.92	351,849.09	133.91
Restoration in the Gwynns Falls Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	1.4	0.0	31.5	0.1
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	15.6	0.5	352.9	0.7
Watershed Association Projects	22.58	0.74	686.64	0.98
EPS Big Tree Sale	0.3	0.0	5.9	0.0
BC Rain Barrel Sale	4.48	0.47	956.23	0.52
Street Sweeping	403.5	161.4	537,992.0	187.5
Inlet Cleaning	148.0	57.3	81,667.0	42.2
Total 2011 – June 30, 2012	595.86	220.41	621,692.17	232
Restoration in the Jones Falls Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	300.0	102.0	465,000	15.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	6.1	0.2	71.3	0.3
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	1.7	0.0	19.5	0.1
Watershed Association Projects	18.88	0.83	446.52	0.75
EPS Big Tree Sale	1.1	0.0	13.3	0.0
BC Rain Barrel Sale	7.07	0.74	710.29	0.81
Street Sweeping	85.4	34.2	113,806.0	39.6
Inlet Cleaning	36.5	14.1	20,195.0	9.5
Total 2011 – June 30, 2012	456.75	152.07	600,261.91	66.06

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Table 9-32: Progress Made in Pollutant Load Reductions and Impervious Area Treated January 2011 through June 30, 2012 (continued)

Restoration in the Back River Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	400.0	136.0	620,000.0	20.0
Shoreline Erosion Control	522.0	177.5	809,100.0	104.4
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
Growing Home Campaign	3.5	0.2	37.6	0.3
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	9.0	0.4	96.6	0.7
Watershed Association Projects	23.08	1.78	595.20	1.62
EPS Big Tree Sale	0.2	0.0	2.1	0.0
BC Rain Barrel Sale	8.41	1.55	877.6	1.74
Street Sweeping	287.1	114.9	382,802.0	133.4
Inlet Cleaning	193.9	75.2	107,032.0	60.3
Total 2011 – June 30, 2012	1447.19	507.53	1,920,543.1	322.46
Restoration in the Baltimore Harbor Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	407.3	267.8	1,116,000	124.0
SWM Retrofit/Conversions	10.5	2.3	1,314.9	2.6
Growing Home Campaign	1.1	0.1	14.1	0.1
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Energy Trees	9.4	0.5	118.1	0.7
Watershed Association Projects	7.44	0.66	220.28	0.47
EPS Big Tree Sale	0.2	0.0	2.4	0.0
BC Rain Barrel Sale	1.91	0.35	240.88	0.4
Street Sweeping	117.9	47.2	157,259.2	54.8
Inlet Cleaning	73.7	28.5	40,656.0	20.0
Total 2011 – June 30, 2012	629.45	347.41	1,315,825.86	203.07

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Table 9-33: Progress Made in Pollutant Load Reductions and Impervious Area Treated – July 1, 2012 through June 30, 2013 (FY13)

Restoration In Deer Creek Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	0.34	0.02	3.65	0.03
BC Rain Barrel Sale	0.10	0.01	22.30	0.01
Street Sweeping	0.0	0.0	0.0	0.0
Inlet Cleaning	0.0	0.0	0.0	0.0
Total July 1, 2012 – June 30, 2013	0.44	0.03	25.95	0.04
Restoration In Prettyboy Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	26.2	1.28	567.4	0.24
EPS Big Tree Sale	0.10	0.00	1.04	0.01
BC Rain Barrel Sale	0.15	0.02	25.49	0.02
Street Sweeping	0.0	0.0	0.0	0.0
Inlet Cleaning	0.44	0.18	180.0	0.11
Total July 1, 2012 – June 30, 2013	26.89	1.48	773.93	0.38
Restoration in the Loch Raven Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	314.9	9.74	3,209.66	12.64
EPS Big Tree Sale	17.06	0.84	183.19	1.33
BC Rain Barrel Sale	5.23	0.55	868.59	0.60
Street Sweeping	248.1	99.2	99,222.0	49.9
Inlet Cleaning	3.33	1.33	1,340.0	0.80
Total July 1, 2012 – June 30, 2013	588.62	111.66	104,823.44	65.27

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Table 9-33: Progress Made in Pollutant Load Reductions and Impervious Area Treated – July 1, 2012 through June 30, 2013 (FY13) (continued)

Restoration in the Lower Gunpowder Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	1,220.0	414.8	330,925	61.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	113.1	8.8	13,687	6.9
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	0.18	0.01	3.79	0.01
EPS Big Tree Sale	0.97	0.05	10.44	0.08
BC Rain Barrel Sale	0.30	0.03	65.96	0.03
Street Sweeping	138.0	55.2	55,219.2	27.8
Inlet Cleaning	5.66	2.26	2,260	1.36
Total July 1, 2012 – June 30, 2013	1,478.21	481.15	402,171.39	97.18
Restoration in the Little Gunpowder Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	0.49	0.02	5.22	0.04
BC Rain Barrel Sale	2.89	0.30	583.26	0.33
Street Sweeping	30.2	12.1	12,079.2	6.1
Inlet Cleaning	0.06	0.02	20	0.01
Total July 1, 2012 – June 30, 2013	33.64	12.44	12,687.68	6.48
Restoration in the Bird River Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	0.12	0.01	4.55	0.01
EPS Big Tree Sale	0.24	0.01	2.61	0.02
BC Rain Barrel Sale	1.9	0.4	221.7	0.39
Street Sweeping	127.3	50.9	50,905.2	25.6
Inlet Cleaning	4.48	1.79	1,800	1.08
Total July 1, 2012 – June 30, 2013	134.04	53.11	52,934.06	27.1

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Section 9 – Watershed Planning, Restoration Progress, and Total Maximum Daily Loads

Table 9-33: Progress Made in Pollutant Load Reductions and Impervious Area Treated – July 1, 2012 through June 30, 2013 (FY13) (continued)

Restoration in the Gunpowder River Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	27.2	1.37	466.05	2.17
EPS Big Tree Sale	0.29	0.01	3.03	0.02
BC Rain Barrel Sale	0.1	0.02	11.9	0.02
Street Sweeping	12.9	5.2	5,176.8	2.6
Inlet Cleaning	5.66	2.26	2,260	1.36
Total July 1, 2012 – June 30, 2013	46.15	8.86	7,917.78	6.17
All Restoration in the Middle River Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	1.27	0.21	144.81	0.23
EPS Big Tree Sale	0.68	0.03	7.31	0.05
BC Rain Barrel Sale	0.6	0.1	74.0	.11
Street Sweeping	47.5	19.0	18,981.6	9.6
Inlet Cleaning	0.46	0.18	180	0.11
Total July 1, 2012 – June 30, 2013	50.51	19.52	19,387.72	10.1
All Restoration in the Liberty Reservoir Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	0.0	0.0	0.0	0.0
EPS Big Tree Sale	0.68	0.03	7.31	0.05
BC Rain Barrel Sale	2.0	0.1	262.7	0.0
Street Sweeping	12.9	5.2	5,176.8	2.6
Inlet Cleaning	0.32	0.13	120	0.08
Total July 1, 2012 – June 30, 2013	15.9	6.36	5,566.81	2.73

Section 9 – Watershed Planning, Restoration Progress, and Total Maximum Daily Loads

Table 9-33: Progress Made in Pollutant Load Reductions and Impervious Area Treated – July 1, 2012 through June 30, 2013 (FY13) (continued)

All Restoration in the Lower North Branch Patapsco Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	9.91	0.40	253.79	0.45
EPS Big Tree Sale	0.73	0.04	7.83	0.06
BC Rain Barrel Sale	1.91	0.20	368.2	.26
Street Sweeping	297.7	119.1	119,066.4	59.9
Inlet Cleaning	8.71	3.48	3,480	2.10
Total July 1, 2012 – June 30, 2013	318.96	123.22	123,176.22	62.77
Restoration in the Gwynns Falls Watershed 2011-FY 12				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	440.2	47.0	75,903	44.7
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	10.06	0.32	273.18	0.45
EPS Big Tree Sale	0.19	0.01	2.09	0.02
BC Rain Barrel Sale	1.24	0.13	265.6	0.14
Street Sweeping	560.8	224.3	224,328.0	112.9
Inlet Cleaning	37.04	14.82	14,820	8.93
Total July 1, 2012 – June 30, 2013	1,049.53	286.58	315,591.87	167.14
Restoration in the Jones Falls Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	5.33	0.24	161.04	0.31
EPS Big Tree Sale	9.48	0.47	101.77	0.74
BC Rain Barrel Sale	1.64	0.17	165.07	0.19
Street Sweeping	118.6	47.5	47,454.0	23.9
Inlet Cleaning	12.86	5.14	5,180	3.1
Total July 1, 2012 – June 30, 2013	147.91	53.52	53,061.88	28.24

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Table 9-33: Progress Made in Pollutant Load Reductions and Impervious Area Treated – July 1, 2012 through June 30, 2013 (FY13) (continued)

Restoration in the Back River Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	310.6	46.5	22,041	41.1
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	30.65	1.99	529.02	2.17
EPS Big Tree Sale	6.12	0.30	65.76	0.48
BC Rain Barrel Sale	3.62	0.67	378.17	0.75
Street Sweeping	399.0	159.6	159,618.0	80.3
Inlet Cleaning	19.94	7.97	7,980	4.80
Total July 1, 2012 – June 30, 2013	769.93	217.03	190,611.95	129.6
Restoration in the Baltimore Harbor Watershed FY 13				
Program	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Stream Restoration	0.0	0.0	0.0	0.0
Shoreline Erosion Control	0.0	0.0	0.0	0.0
SWM Retrofit/Conversions	0.0	0.0	0.0	0.0
EPS Community Reforestation Program	0.0	0.0	0.0	0.0
Watershed Association Projects	2.69	0.16	56.48	0.24
EPS Big Tree Sale	0.29	0.01	3.13	0.02
BC Rain Barrel Sale	0.94	0.17	118.69	0.20
Street Sweeping	163.9	65.6	65,572.8	33.0
Inlet Cleaning	13.04	5.22	5,220	3.14
Total July 1, 2012 – June 30, 2013	180.86	71.16	70,971.1	36.6

Table 9-34 summarizes the data from Table 9-31 by watershed, while Table 9-35 summarizes the data from Table 9-32 by watershed, and Table 9-36 summarizes the data from Table 9-33 by watershed. Table 9-37 summarizes the cumulative impervious cover treated through June 30, 2013 by watershed and the percentage addressed.

Table 9-34: Pollutant load Reductions and Impervious Area Treated by Watershed Through 2010

Watershed	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Prettyboy	177.0	7.30	4,926	6.2
Loch Raven Reservoir	6,110.3	1,624.3	7,066,788	341.9
Lower Gunpowder Falls	4,036.8	1,301.6	5,894,836	198.3
Little Gunpowder Falls	0	0	0	0
Bird River	5,813.1	1,858.2	7,971,889	369.4
Gunpowder River	117.9	32.3	68,023	25.6
Middle River	2,639.1	1,509.3	6,071,591	684.3
Liberty Reservoir	0	0	0	0
Patapsco River	896.9	249.2	1,028,688	86.2

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Gwynns Falls	892.5	222.4	915,269	82.7
Jones Falls	2,161.0	616.0	2,670,814	165.0
Back River	5,342.9	2,444.2	9,814,253	735.2
Baltimore Harbor	1,550.8	736.6	2,507,174	589.7
Restoration Progress through 2010	29,738.3	10,601.4	44,014,251	3,284.5

Table 9-35: Pollutant load Reductions and Impervious Area Treated by Watershed January 1, 2011 Through June 30, 2012

Watershed	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Prettyboy	126.8	5.53	3,809	3.94
Loch Raven Reservoir	452.8	109.26	288,334	111.35
Lower Gunpowder Falls	224.7	61.06	161,864	61.11
Little Gunpowder Falls	0.0	0.0	0.0	0.0
Bird River	133.0	50.58	18,694	52.15
Gunpowder River	24.6	8.92	19,648	7.93
Middle River	67.0	25.45	61,936	23.98
Liberty Reservoir	0.0	0.0	0.0	0.0
Patapsco River	358.8	132.92	351,489	133.91
Gwynns Falls	595.9	220.41	621,692	232.00
Jones Falls	456.8	152.07	600,262	66.06
Back River	1,447.2	507.53	1,920,543	322.46
Baltimore Harbor	629.5	347.41	1,315,825	203.07
Total 2011 – June 30, 2012	4,517.1	1,621.14	5,364,096	1,217.96

Table 9-36: Pollutant load Reductions and Impervious Area Treated by Watershed July 1, 2012 Through June 30, 2013

Watershed	Removal Rate (lb./year)			Equivalent Impervious Acres
	TN	TP	TSS	
Deer Creek	0.44	0.03	25.95	0.04
Prettyboy Reservoir	26.89	1.48	773.93	0.38
Loch Raven Reservoir	588.62	111.66	104,823.44	65.27
Lower Gunpowder Falls	1,478.21	481.15	402,171.39	97.18
Little Gunpowder Falls	33.64	12.44	12,687.68	6.48
Bird River	134.04	53.11	52,934.06	27.1
Gunpowder River	46.15	8.86	7,917.78	6.17
Middle River	50.51	19.52	19,387.72	10.1
Liberty Reservoir	15.9	6.36	5,566.81	2.73
Patapsco River	318.96	123.22	123,176.22	62.77
Gwynns Falls	1,049.53	286.58	315,591.87	167.14
Jones Falls	147.91	53.52	53,061.88	28.24
Back River	769.93	217.03	190,611.95	129.6
Baltimore Harbor	180.86	71.16	70,971.1	36.6
Total 2011 – June 30, 2012	4,841.59	1,446.12	1,359,701.78	639.8

Table 9-37: Impervious Area Treated Through June 30, 2013

Watershed	BC Impervious Required	Equivalent Impervious Acres Addressed				Percent
		Through 2010	FY 2012	FY 2013	Total	
Deer Creek	104.5	0.0	0.0	.04	0.04	0.04%

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Prettyboy	327.6	6.2	3.94	0.38	10.52	3.2%
Loch Raven Reservoir	4,904.7	341.9	8.45	65.27	415.62	8.5%
Lower Gunpowder Falls	1,732.3	198.3	3.61	97.18	298.99	17.26%
Little Gunpowder Falls	444.8	0.0	0.0	6.48	6.48	1.46%
Bird River	1,718.3	369.4	0.95	27.1	397.45	23.13%
Gunpowder River	323.7	25.6	0.33	6.17	32.1	9.92%
Middle River	987.7	684.3	0.48	10.1	694.88	70.35%
Liberty Reservoir	438.9	0	0.0	2.73	0.0	0.62%
Patapsco River	3,230.0	86.2	2.01	62.77	150.98	4.67%
Gwynns Falls	4,673.2	82.7	2.3	167.14	252.14	5.40%
Jones Falls	2,869.2	165.0	16.96	28.24	210.2	7.33%
Back River	4,713.8	735.2	128.76	129.6	993.56	21.08%
Baltimore Harbor	2,514.1	589.7	128.27	36.6	754.56	30.01%
Restoration Progress through June 30, 2013	28,982.8	3,284.5	295.96	639.8	4,220.26	14.56%

Table 9-37 shows a decrease in the amount of impervious cover treated compared to last years' report. This is due to street sweeping and storm drain cleaning being annual practices, while they are included in the FY2013 column; they have been subtracted from the FY2012 column. The column labeled "through 2010" does not have street sweeping nor storm drain cleaning in the calculations. Each year, the previous years' progress will be modified by subtracting the annual practices.

While significant progress has been made the County is still short of meeting the 20% impervious surface treated target. Some of the short fall will be made up as the County develops tracking mechanisms for certain restoration activities that are currently not tracked, such as, redevelopment and revitalization projects, and existing roadway disconnects.

9.6 Progress in Meeting Local TMDLs and the Chesapeake Bay TMDL

9.6.1 Local TMDLs

The next term of the permit will require the development of TMDL Implementation Plans for the TMDLs listed in Table 9-2 within one year of Baltimore County NPDES – MS4 permit re-issuance and within one year of EPA approval for any TMDLs developed subsequent to the permit re-issuance. While those TMDL Implementation Plans have not been developed to date, Baltimore County is tracking reductions of nutrients and sediment by watershed. For non-conventional pollutants, such as, bacteria, mercury and PCBs in fish tissue, and trash, the county will need to develop pollutant removal efficiencies for various practices in order to plan and track reductions. These efficiencies will initially be developed based on available literature at the time we develop the TMDL implementation plan for each constituent. While nitrogen, phosphorus, and sediment reductions have been tracked (Tables 9-31, 9-32 and 9-33) progress in meeting local nutrient and sediment TMDL reductions will not be reported in this annual report. It is necessary to reconcile the pollutant loads developed through the Chesapeake Bay TMDL with those developed through modeling for the local TMDLs for nutrients and sediment. Currently all of our calculations are based on the Chesapeake Bay TMDL nutrient and sediment loading rates for the various land uses. Once the relationship between the local TMDL load and the Chesapeake Bay TMDL load is established for each local nutrient and sediment TMDL, then it will be possible to apply correction factors to avoid over or underestimating the amount of progress being made in addressing the local TMDL.

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The Chesapeake Bay TMDL was developed in December 2010 and refined in July 2011. The CB TMDL is based on a series of interlinked models. The Watershed Model provides the pollutant loading input into the Chesapeake Bay from the various land uses, septic systems, and point sources. The agricultural sources of pollutant loads will not be addressed in this annual report, nor will actions taken by the State of Maryland or the federal government. For future reports an attempt will be made to include actions taken by the agriculture section, the State of Maryland, and the federal government.

Progress made in meeting the Chesapeake Bay TMDL may be viewed in two fashions; progress in meeting the 2-year milestones (Section 9.6.2.1) and overall load reductions (Section 9.6.2.2).

9.6.2.1 Progress in Meeting the 2-year Milestones

Baltimore County submitted its Phase II Watershed Implementation Plan (WIP) to MDE on July 2, 2012. To view the Baltimore County Phase II WIP, see:

http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Documents/FINAL_PhaseII_Report_Docs/Final_County_WIP_Narratives/Baltimore_County_WIPII_2012.pdf

Urban Stormwater Load Reduction Progress – Restoration Milestones: The Baltimore County proposal for 2-year milestone urban stormwater source nutrient reductions in the Phase II WIP are presented in Table 9-38. This table displays the individual strategies, the proposed amount of action to take place and the expected nitrogen and phosphorus reductions that will result from implementation. The nitrogen and phosphorus reductions are expressed as delivered load.

Table 9-38: 2-year Milestone Targets for Each Restoration Strategy and Expected Nitrogen and Phosphorus Reductions

Strategy	Type*	Acres/Linear Feet July 1, 2011 – June 30, 2013	Nitrogen Reduction	Phosphorus Reduction
Stream Restoration (Interim Rate)	C	63,174 feet	7,165	4,225
Shoreline Erosion Control	C	5,190 feet	830	571
SWM Retrofit/Conversions	C	669 acres	1,268	165
Street Sweeping	A	Current Rate	4,238	1,620
Storm Drain Cleaning	A	Current Rate	734	284
Nutrient Management 1998	A	6,125 acres	4,565	204
SSO Elimination	C	20% reduction	230	76
Upland Reforestation	C	20 acres	85	3
Riparian Buffer Reforestation	C	10 acres	57	4
Urban Tree Canopy Planting	C	1,400 trees	59	2
Redevelopment	C	200 acres	915	106
Watershed Association Projects	C	Current Rate	155	15
Total Reductions			20,301	7,275
Reduction Target			35,318	3,873
Remaining Reduction Needed			15,335	-3,402

The actual implementation of the restoration strategies during the 2-year milestone is presented in Table 9-39. Also included in this table is the percent of target achieved for each strategy. In a number of cases the tracking mechanism has not been developed, but actions have occurred.

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Table 9-39: 2-year Milestone Progress on Restoration Strategies and Percent of Target Achieved

Strategy	Type*	Acres/Linear Feet as of July 1, 2011 – June 30, 2013	Completed January 1, 2011 through June 30, 2012	Completed FY13	2-Year Milestone Completed	% Target
Stream Restoration (Interim Rate)	C	63,174 feet	3,500 feet	6,100 feet	9,600 feet	15.2%
Shoreline Erosion Control	C	5,190 feet	5,710 feet	0 feet	5,710 feet	110.0 %
SWM Retrofit/Conversions	C	669 acres	15.2 acres	290.2 acres	305.4 acres	45.6%
Street Sweeping	A	Current Rate	Below Historic Rate	Below Historic Rate		35.9%
Storm Drain Cleaning	A	Current Rate	~ Same as Historic Rate	Below Historic Rate		104.2 %
Nutrient Management 1998	A	6,125 acres	6,125 acres	6,125 acres	6,125 acres	100.0 %
SSO Elimination	C	20% reduction	Need to develop tracking mechanism			
Upland Reforestation	C	20 acres	39.6 acres	0.0 acres	39.6 acres	198.0 %
Riparian Buffer Reforestation	C	10 acres	Need to develop tracking mechanism	Need to develop tracking mechanism		
Urban Tree Canopy Planting	C	1,400 trees	1,678	368	2,046	146.1 %
Redevelopment	C	200 acres		122	122	61.0%
Watershed Association Projects	C	Current Rate	~ Same as Historic Rate			93.5%

Tables 9-40 and 9-41 show the progress made by strategy in reduction nitrogen and phosphorus delivered loads, respectively.

Table 9-40: Progress in the Reduction of Nitrogen by Strategy for the First 2-year Milestone Period (Delivered Load, #s)

Strategy	Type*	Nitrogen Reduction	Completed January 1, 2011 through June 30, 2012	Completed FY 13	Total 2-Year Milestone Complete	Remaining	% Target
Stream Restoration (Interim Rate)	C	7,165	441	1,220	1,660	5,504	23.3%
Shoreline Erosion Control	C	830	909.5	0	909.5	-79.5	109.6%
SWM Retrofit/Conversions	C	1,268	44.5	1,680	1,725	-457	136.0%
Street Sweeping&	A	4,238	917.9	1,553	1,553	2,685	15.3%
Storm Drain Cleaning&	A	734	509.1	112	112	622	69.4%
Nutrient Management 1998*	A	4,565	4,565	4,565	4,565	0	100.0%
SSO Elimination**	C	230	0	0	0	230	0.0%
Upland Reforestation	C	85	168	0	168	-83	197.6%
Riparian Buffer Reforestation**	C	57	0	0	0	57	0.0%
Urban Tree Canopy Planting	C	59	47.9	39.8	87.7	-28.7	148.6%
Redevelopment***	C	915	0	399	399	516	43.6%

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Watershed Association Projects	C	155	145.0	699.7	844.7	-689.7	545%
Total Reductions		20,301	7,747.9	10,268.5	12,023.9	8,276.1	59.2%

* Expert Panel results not available for use yet

** Additional reductions due to these efforts, but tracking mechanism not yet developed. These actions account for a total of 2.6% of the nitrogen reduction.

*** Redevelopment tracking mechanism recently developed, additional redevelopment projects have not been analyzed for reduction credits at this time.

& Annual Practice, only most recent year counts

Table 9-41: Progress in the Reduction of Phosphorus Strategy for the First 2-year Milestone Period (Delivered Load, #s)

Strategy	Type*	Phosphorus Reduction	Completed January 1, 2011 through June 30, 2012	Completed FY 13	Total 2-Year Milestone Complete	Remaining	% Target
Stream Restoration (Interim Rate)	C	4,225	156.6	414.8	571.4	3,653.6	13.5%
Shoreline Erosion Control	C	442.5	571	0	571	128.5	77.5%
SWM Retrofit/Conversions	C	165	7.2	321.8	329	157.8	199.4%
Street Sweeping&	A	1,620	408.2	862.8	862.8	1,211.8	25.2
Storm Drain Cleaning&	A	284	209.3	36.8	36.8	74.7	73.7%
Nutrient Management 1998*	A	204	204	204	204	0	100.0%
SSO Elimination**	C	76	0.0	0.0	0.0	76	0.0%
Upland Reforestation**	C	3	0.0	0.0	0.0	3	0.0%
Riparian Buffer Reforestation**	C	4	0.0	0.0	0.0	4	0.0%
Urban Tree Canopy Planting	C	2	1.8	1.0	2.8	-0.8	140.0%
Redevelopment***	C	106		51.4	51.4	54.6	48.5%
Watershed Association Projects	C	15	8.4	17.4	35.8	-20.8	56.1%
Total Reductions		7,146.5	1,617.9	1,910.0	2,665.0	5,342.4	37.3%

* Expert Panel results not available for use yet

** Additional reductions due to these efforts, but tracking mechanism not yet developed. These actions account for a total of 2.6% of the nitrogen reduction.

*** Redevelopment tracking mechanism recently developed, additional redevelopment projects have not been analyzed for reduction credits at this time.

& Annual Practice, only most recent year counts

As can be seen from Table 9-40 and 9-41, Baltimore County has achieved a 59.2% of nitrogen target and a 37.3% of the phosphorus target. There are a significant number of projects that are currently in construction, in design, or ready for construction. Table 9-42 displays the status of capital restoration projects that are currently in the pipeline, along with their status and the linear feet or acres of improvement. Prior to the next annual report all tracking mechanisms will be developed and the improvements associated with strategies currently not tracked will be included. In addition, non-capital improvement strategies will continue and provide additional pollutant removal.

Table 9-42: Capital Restoration Projects in the Pipeline and Status

Project	Watershed	Status	Unit	Amount
East Beaver Dam Stream Restoration	Loch Raven	In Design	Linear Feet	1,600
White Marsh Road Stream Restoration	Bird River	In Design	Linear Feet	5,200
West Branch North Fork White Marsh Run Stream Restoration	Bird River	In Design	Linear Feet	8,000
Proctor Lane Lower Gunpowder Falls Trib Stream Restoration	Lower Gunpowder Falls	In Design	Linear Feet	2,000
Scotts Level Branch @McDonogh Road Stream Restoration	Gwynns Falls	In Design	Linear Feet	1,125

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Scotts Level Branch @McDonogh Road Emergent and forested wetland creation	Gwynns Falls	In Design	Acres	2.66
Scotts Level Branch @McDonogh Road Floodplain enhancement	Gwynns Falls	In Design	Acres	1.77
Dead Run – Westview Park	Gwynns Falls	In Design	Linear feet	4,500
Roland Run @Greenspring Stream Restoration	Jones Falls	In Design	Linear feet	3,500
Towson Run @ Cloisters Stream Restoration	Jones Falls	In Design	Linear Feet	3,000
Herring Run @ Overlook Park Stream Restoration	Back River	In Design	Linear Feet	9,000
Bread and Cheese Creek Stream Restoration	Back River	In Design	Linear Feet	1,523
Total			Linear Feet	39,488

Additional Pollutant Load Reductions Not Specified in the Baltimore County Watershed Implementation Plan or the 2-Year Milestones

While Baltimore County has not achieved its' 2-year milestone targets through the actions identified in the Baltimore County Watershed Implementation Plan, additional reductions have been achieved through other actions; specifically reductions through an overestimate of the amount of land development in the Chesapeake Bay Watershed Model as reflected in MAST and conversion of operating quarries to development with subsequent reductions due to the termination of the associated discharge permits and a lower land use load with stormwater treatment.

Reductions due to overestimate of the amount of land under development: The Chesapeake Bay Watershed Model predicts a certain number of acres to be under development on an annual basis. This data is reflected in the Maryland Assessment Scenario Tool (MAST) based on the July 2011 model run. The actual acres of disturbance is based on the grading permits issued by Baltimore County (acres of disturbance due to State projects are not captured). Table 9-43 displays the actual versus the predicted acres of disturbance, and the difference between the two by watershed.

Table 9-43: Actual Acres of Disturbance versus Predicted Acres of Disturbance (FY2013)

Watershed	Number of Permits	Acres of Disturbance	Model Acres of Disturbance	Difference
Upper Western Shore				
Deer Creek	1	0.45	9.34	-8.89
Prettyboy Reservoir	1	3.00	35.65	-32.65
Loch Raven Reservoir	14	50.38	415.87	-365.49
Lower Gunpowder Falls	10	47.12	212.18	-165.06
Little Gunpowder Falls	2	0.50	16.97	-16.47
Bird River	12	62.60	179.08	-116.48
Gunpowder River	5	4.16	8.57	-4.41
Middle River	3	0.70	0.00	0.70
UWS Totals	48	168.91	877.66	-708.75
Patapsco/Back River				
Liberty Reservoir	5	12.13	50.92	-38.79
Patapsco River	10	24.65	237.64	-212.99
Gwynns Falls	16	74.74	331.85	-257.11
Jones Falls	13	18.83	152.77	-133.94
Back River	13	27.24	95.90	-68.66
Baltimore Harbor	7	12.46	0.00	12.46
P/B Totals	64	170.05	869.08	-699.03
County Totals	112	338.96	1,746.74	-1,407.88

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County-wide there were 1,408 fewer acres of disturbance than predicted by the Chesapeake Bay Watershed Model and reflected in MAST. Using the watershed specific per acre loading rates due to construction for nitrogen, phosphorus, and sediment the difference between the model loading and the actual loading was calculated. This difference reflects a reduction in the amount of nitrogen, phosphorus, and sediment loadings in Baltimore County. Tables 9-44 and 9-45 display the analysis for nitrogen and phosphorus, respectively.

Table 9-44: Difference between Modeled and Actual Nitrogen Loading Rates Due to Construction

Watershed	Acres of Disturbance	Model Acres of Disturbance	Difference	Model Load Rates N	Model N Load	FY13 Actual N Load	Difference
Upper Western Shore							
Deer Creek	0.45	9.34	-8.89	32.3	301.7	14.5	-287.1
Prettyboy Reservoir	3.00	35.65	-32.65	32.3	1,151.5	96.9	-1,054.6
Loch Raven Reservoir	50.38	415.87	-365.49	32.3	13,432.6	1,627.3	-11,805.3
Lower Gunpowder Falls	47.12	212.18	-165.06	32.3	6,853.4	1,522.0	-5,331.4
Little Gunpowder Falls	0.50	16.97	-16.47	32.3	548.1	16.2	-532.0
Bird River	62.60	179.08	-116.48	17.89	3,203.7	1,119.9	-2,083.8
Gunpowder River	4.16	8.57	-4.41	17.89	153.3	12.5	-78.9
Middle River	0.70	0.00	0.70	17.89	0.0	3.6	3.6
UWS Totals	168.91	877.66	-708.75		25,644.3	4,412.9	-21,169.5
Patapsco/Back River							
Liberty Reservoir	12.13	50.92	-38.79	32.3	1,644.7	391.8	-1,252.9
Patapsco River	24.65	237.64	-212.99	38.84	6,853.5	710.9	-6,142.6
Gwynns Falls	74.74	331.85	-257.11	32.3	10,718.8	2,414.1	-8,304.7
Jones Falls	18.83	152.77	-133.94	32.3	4,934.5	608.2	-4,326.3
Back River	27.24	95.90	-68.66	17.89	1,715.7	487.3	-1,228.3
Baltimore Harbor	12.46	0.00	12.46	29.21	0.0	364.0	364.0
P/B Totals	170.05	869.08	-699.03		25,867.2	4,976.3	-20,890.8
County Totals	338.96	1,746.74	-1,407.88		51,551.5	9,389.2	-42,060.3

Table 9-45: Difference between Modeled and Actual Phosphorus Loading Rates Due to Construction

Watershed	Acres of Disturbance	Model Acres of Disturbance	Difference	Model Load Rates P	Model P Load	FY13 Actual P Load	Difference
Upper Western Shore							
Deer Creek	0.45	9.34	-8.89	5.15	48.1	2.3	-45.8
Prettyboy Reservoir	3.00	35.65	-32.65	5.15	183.6	15.5	-168.1
Loch Raven Reservoir	50.38	415.87	-365.49	5.15	2,141.7	259.5	-1,882.3
Lower Gunpowder Falls	47.12	212.18	-165.06	5.15	1,092.7	242.7	-850.1
Little Gunpowder Falls	0.50	16.97	-16.47	5.15	87.4	2.6	-84.8
Bird River	62.60	179.08	-116.48	5.1	913.3	319.3	-594.0
Gunpowder River	4.16	8.57	-4.41	5.1	43.7	21.2	-22.5
Middle River	0.70	0.00	0.70	5.1	0.0	3.6	3.6
UWS Totals	168.91	877.66	-708.75		4,510.5	866.7	-3,644.0

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Patapsco/Back River							
Liberty Reservoir	12.13	50.92	-38.79	5.15	262.2	62.5	-199.8
Patapsco River	24.65	237.64	-212.99	4.6	1,093.1	113.4	-979.8
Gwynns Falls	74.74	331.85	-257.11	5.15	1,709.0	384.9	-1,324.1
Jones Falls	18.83	152.77	-133.94	5.15	786.8	97.0	-689.8
Back River	27.24	95.90	-68.66	5.1	489.1	138.9	-350.2
Baltimore Harbor	12.46	0.00	12.46	5.14	0.0	64.0	64.0
P/B Totals	170.05	869.08	-699.03		4,340.2	860.7	-3,479.7
County Totals	338.96	1,746.74	-1,407.88		8,850.7	1,727.4	-7,123.7

As can be seen from the preceding tables, there were 42,060 fewer pounds of nitrogen, and 7,124 fewer pounds of phosphorus.

Reductions due to closing of quarries and conversion to development: Two quarries have recently closed and are in the process of being developed, this results in pollutant load reductions due to several factors; elimination of nutrients and sediment due to discharges from the quarry that reflect loads due to quarry operations and change in land use with differential nutrient and sediment loading rates. The two quarries are Greenspring Quarry in Jones Falls and Delight Quarry in Gwynns Falls. Information on the two quarries is provided in Table 9-46.

Greenspring Quarry had already terminated its discharge permit and this is reflected in the Chesapeake Bay Watershed Model, however, the discharge permit for Delight Quarry was still in effect at the time of model development.

Table 9-46: Load Reductions Due to Development of Quarries

Quarry	Discharge Permit			Land Use			Total		
	N	P	TSS	N	P	TSS	N	P	TSS
Quarry Loadings									
Greenspring	NA – not in the model			1,291	205	153,515	1,291	205	153,515
Delight	1,244	444	4,164	653	104	176,847	1,897	548	181,011
Development Loadings									
Greenspring	0	0	0	1,066	57	33,649	1,066	57	33,649
Delight	0	0	0	542	29	38,515	542	29	38,515
Difference									
Greenspring	NA – not in the model			-225	-148	-119,866	-225	-148	-119,866
Delight	-1,244	-444	-4,164	-111	-75	-138,332	-1,355	-519	-142,496
Totals	-1,244	-444	-4,164	-336	-233	-258,198	-1,580	-667	-262,362

The effect of changing land use and retirement of discharge permits for these two quarries results in a reduction of 1,580 pounds of nitrogen and 667 pounds of phosphorus. The reduction is actually greater, as these calculations do not take into account the installation of stormwater management on the development sites. Taking into account these two additional reductions Baltimore County will have exceeded its 2-year milestone targets for nitrogen and phosphorus as displayed in Table 9-47.

Table 9-47: Total Reductions in Relation to Target Reductions

Constituent	Target	Restoration	Reduced Grading	Quarry Development	Remaining
Nitrogen	20,301	-12,024	-42,060	-1,580	-38,363
Phosphorus	7,147	-2,665	-7,124	-667	-3,309

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Urban Stormwater Load Reduction Progress – Programmatic Milestones: In addition, to restoration 2-year milestones, programmatic milestones were developed as part of the Baltimore County Phase II WIP. The various programmatic milestones and their status are presented in Table 9-48.

Table 9-48: 2-Year Urban Stormwater Programmatic Milestones and Their Status

Programmatic Milestone	Status
Work with the State of Maryland to develop adequate mechanisms to fund the increased restoration pace and the staff needed to meet the urban stormwater reduction allocations by 2025.	Stormwater Utility Fee developed and billed
Develop tracking and reporting mechanisms for redevelopment and revitalization to assess load reductions	Tracking system developed, but need refinement
Develop tracking and report mechanisms for green field development to assess load increases	Superseded by the State - Accounting for Growth Offset Policy and Regulations currently in development
Work with MDE, Baltimore City, Anne Arundel County, and Howard County to define each jurisdiction's share of the remaining capacity of the WWTPs	Not initiated yet. Not sure if it is necessary to develop a Trading – In – Time Program
Work with MDE, Baltimore City, Anne Arundel County, and Howard County to refine the concept of Trading-In-Time and develop formal agreements, if it is determined that the contingency is needed to meet the overall nutrient reductions	Not initiated yet. Not sure if it is necessary to develop a Trading – In – Time Program
Continue working with the Chesapeake Bay Program – Urban Stormwater Workgroup expert panel to determine new stream restoration pollutant load reduction credits	Expert Panel Report of Stream Restoration finalized. Baltimore County also worked on the Approved Retrofit Accounting and is working on the Illicit Connection, Shoreline Erosion Control, and Urban Riparian Buffer Panels for pollution reduction credits
Develop a reforestation program funded through capital funds	Not initiated yet, staffing as a result of the Stormwater Utility Fee is gearing up, and capital funds have been provided
Coordinate between the Departments of Public Works and Environmental Protection and Sustainability to target street sweeping and storm drain cleaning in neighborhoods identified through the Neighborhood Source Assessment in the Small Watershed Action Plans	Have coordinated with DPW to target street sweeping based on neighborhoods identified through the development of SWAPs. Street sweeping is currently undergoing assessment for expansion.
Continue to work with the Farm Trust to determine if there are pollutant load reduction credits associated with Preservation Programs	Continuing, although there has been no recent activity.
Continue to explore the possibility of pollutant load reduction credits as a result of Baltimore County's land use planning through the implementation of the 2020 Master Plan	Baltimore County is a member of the Chesapeake Bay Program – Land Use Work group that will explore these issues.
Continue to work with the State and the Chesapeake Bay Program to find solutions to the Watershed Model technical and data deficiencies identified in Chapter 6 below	Baltimore County is a member of the Urban Stormwater and Land Use Workgroups that are working on these issues.

Section 9 – Watershed Planning, Restoration Progress, and Total Maximum Daily Loads***On-Site Sewage Disposal Systems (OSDS) Nutrient Reduction Progress – Restoration Milestones:***

The OSDS Strategy for meeting the nitrogen reduction target for 2025 is presented in Table 9-49. This translates into 20 upgrades per year of existing OSDS to denitrifying systems, 14 hook-ups to the sanitary sewer system per year of existing OSDS, and 7,800 pump-outs per year.

Table 9-49: OSDS Strategy for Meeting Nitrogen Reductions Targets by 2025

Strategy	# of Systems	Nitrogen Reduction	Remaining Nitrogen Load	Remaining to Meet Target
2009 Progress from MAST			166,285	60,148
Health Projects	1,537	-24,201	142,084	35,947
Growth Area Adjustments	7,805	-33,649	108,435	2,298
De-nitrifying Systems	220	-897	107,538	1,401
Future Health Projects	200	*	*	*
OSDS Pump-outs	7,800/yr	-464	106,469	332

The installation of OSDS denitrifying systems is supported by the Bay Restoration Fund (see: <http://www.mde.maryland.gov/programs/Water/BayRestorationFund/OnsiteDisposalSystems/Pages/Water/cbwrf/index.aspx> for further information). Maryland Department of the Environment provides assessment of the nitrogen removal efficiencies for the various denitrifying systems available through the Maryland Verification Process. There are three different types of systems installed in Baltimore County during the reporting period. Table 9-50 indicates the number of systems installed by type, location, and the MDE reported pollutant removal efficiencies for the first reporting year and Table 9-51 presents the same data for second year of the 2-year milestone.

Table 9-50: FY 2012 - Number of Denitrifying Systems Installed by Type and Removal Efficiency

System Type	Number Installed			Removal Efficiency
	CBCA	>1,000	<1,000	
Hoot	3	3	1	64%
Singular	4	1	3	55%
Biomicrobics – Microfast/Retrofast	0	0	1	57%

Table 9-51: FY 2013 - Number of Denitrifying Systems Installed by Type and Removal Efficiency

System Type	Number Installed			Removal Efficiency
	CBCA	>1,000	<1,000	
Hoot	1	4	4	64%
Singular	1	2	2	55%
Biomicrobics – Microfast/Retrofast	0	1	0	57%
Adventex	1	0	0	71%
Septi-Tech	0	2	0	67%

The amount of nitrogen delivered to the Chesapeake Bay from OSDS is the result of the landscape location of the system and the delivery ratio of the watershed for nitrogen. There are three landscape position factors that relate to the delivery of nitrogen from OSDS to the edge-of-stream:

- Chesapeake Bay Critical Area (CBCA) – 16.44 pounds nitrogen per OSDS
- Less than 1,000 feet from a perennial stream (<1,000) – 10.27 pounds nitrogen per OSDS
- Greater than 1,000 feet from a perennial stream (>1,000) – 6.16 pounds nitrogen per OSDS.

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The numbers above are derived from Maryland Assessment Scenario Tool (MAST) by dividing the number of MAST derived septic systems into the Edge-of-Stream nitrogen load. Using this information and the geographical location of the installed denitrifying systems, the edge-of-stream (EOS) nitrogen load, the EOS nitrogen reduction and delivered load (based on the watershed specific nitrogen delivery ratio) can be calculated. The results of the calculations are presented in Table 9-52 for the first year of the 2-year milestone and in Table 9-53 for the second year. The OSDS pumpout information for fiscal year 2013 is presented in Table 9-54.

Table 9-52: OSDS Upgrades to Denitrifying Systems January 1, 2011 Through June 30, 2012 by Watershed

Watershed	OSDS Location			EOS Total Nitrogen	EOS Total Reduction	Delivery Ratio	Delivered Load Reduction
	CBCA	<1,000 feet	>1,000 feet				
Deer Creek	0	0	0	0	0	57.4%	0
Prettyboy	0	0	0	0	0	5.5%	0
Loch Raven	0	2	0	20.54	11.22	25.9%	2.91
Lower Gunpowder	0	2	4	45.18	27.37	88.8%	24.30
Little Gunpowder	0	0	0	0	0	70.8%	0
Bird River	3	0	0	49.32	31.56	87.5%	27.62
Gunpowder River	3	0	0	49.32	27.12	100%	27.12
Middle River	0	0	0	0	0	100%	0
Liberty	0	0	1	6.16	3.39	0.0%	0
Patapasco River	0	0	0	0	0	53.2%	0
Gwynns Falls	0	0	0	0	0	33.7%	0
Jones Falls	0	0	0	0	0	18.6%	0
Back River	1	0	0	16.44	9.04	96.2%	8.70
Baltimore Harbor	0	0	0	0	0	100%	0
Totals	7	4	5	486.96	109.70		90.64

Table 9-53: OSDS Upgrades to Denitrifying Systems July 1, 2011 Through June 30, 2013 by Watershed

Watershed	OSDS Location			EOS Total Nitrogen	EOS Total Reduction	Delivery Ratio	Delivered Load Reduction
	CBCA	<1,000 feet	>1,000 feet				
Deer Creek	0	0	0	0.00	0.00	57.4%	0.00
Prettyboy	0	0	0	0.00	0.00	5.5%	0.00
Loch Raven	0	2	1	22.59	13.72	25.9%	3.55
Lower Gunpowder	0	3	6	67.77	42.04	88.8%	37.31
Little Gunpowder	0	2	0	20.54	12.22	70.8%	8.65
Bird River	2	0	0	32.88	22.19	87.5%	19.42
Gunpowder River	0	0	0	0.00	0.00	100%	0.00
Middle River	0	0	0	0.00	0.00	100%	0.00
Liberty	0	0	0	0.00	0.00	0.0%	0.00
Patapasco River	0	0	0	0.00	0.00	53.2%	0.00
Gwynns Falls	0	0	0	0.00	0.00	33.7%	0.00
Jones Falls	0	0	1	6.16	3.94	18.6%	1.33
Back River	1	0	0	16.44	9.04	96.2%	8.70
Baltimore Harbor	0	0	0	0.00	0.00	100%	0.00
Totals	3	7	8	166.38	103.15		78.96

Table 9-54: OSDS Pump-outs July 1, 2012 Through June 30, 2013 by Watershed (FY2013)

Watershed	OSDS Location			EOS Total Nitrogen	EOS Total Reduction	Delivery Ratio	Delivered Load Reduction
	CBCA	<1,000 feet	>1,000 feet				
Deer Creek	0	4	31	232.04	11.60	57.4%	6.66
Prettyboy	0	11	62	494.89	24.74	5.5%	1.36

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Loch Raven	0	555	1205	13,122.65	656.13	25.9%	169.94
Lower Gunpowder	0	156	227	3,000.44	150.02	88.8%	133.22
Little Gunpowder	0	115	224	2,560.89	128.04	70.8%	90.66
Bird River	6	22	26	484.74	24.24	87.5%	21.21
Gunpowder River	4	0	2	78.08	3.90	100%	3.90
Middle River	7	0	4	139.72	6.99	100%	6.99
Liberty	0	79	165	1,827.73	91.39	0.0%	0.00
Patapasco River	0	71	210	2,022.77	101.14	53.2%	53.81
Gwynns Falls	0	70	172	1,778.42	88.92	33.7%	29.97
Jones Falls	0	220	368	4,526.28	226.31	18.6%	42.09
Back River	2	1	6	80.11	4.01	96.2%	3.85
Baltimore Harbor	6	0	15	191.04	9.55	100%	9.55
Totals	25	1,304	2,717	30,539.8	1,526.98		573.21

The installation of eighteen denitrifying systems in fiscal year 2013 resulted in 78.96 pounds of nitrogen reduction. The target for the 2-year milestone was 40 denitrifying systems and 163.2 pounds of nitrogen reduction (an average of 4.08 pounds nitrogen reduction per system times 40 systems). Table 9-55 presents the progress in meeting the first 2-year milestones. .

Table 9-55: Progress in Meeting the 2-Year Milestones for OSDS Remediation

Strategy	Target	First Year	Second Year	Total	% of Target
Denitrifying Systems #	40	16	18	34	85.0%
Denitrifying N Reduction (#s)	163.2	90.64	78.96	169.6	103.9%
Hook-ups to Sanitray Sewer	28				
Hook-up N Reduction (#s)	Not Calculated	Have to develop a tracking system			
OSDS Pump-outs	7,800	NA	4,046	4,046	51.9%
Pump-out N Reduction (#s)	464.0	NA	573.21	573.21	123.5%
Total Nitrogen Reduced	627.1	90.64	652.17	742.81	118.5%

While the target for the number of denitrifying system installations was not achieved and the number of pump-outs was not achieved, the pounds of nitrogen reduction was exceeded the target for each. For the denitrifying system installations, a greater proportion was installed in the Chesapeake Bay Critical Area than are represented in the overall distribution of OSDS in Baltimore County. In addition, the actual pollutant removal efficiencies of the systems installed was used in the calculation and each system exceeded the 50% reduction used in MAST calculations. The OSDS pump-outs are considered an annual practice and only count for the last year of the 2-year milestone. While only half of the target number of pump-outs was achieved, the distribution of the pump-out locations resulted in exceeding the target nitrogen reduction.

On-Site Sewage Disposal (OSDS) Nutrient Reduction Progress – Programmatic Milestones:

The status of the various OSDS programmatic milestones is displayed in Table 9-56. While a number of the items are complete, and some are on-going; progress still needs to be made in the

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development of several tracking systems and a discussion of how to address OSDS problem areas needs to be initiated.

Table 9-56: OSDS Programmatic Milestones - Status

Programmatic Milestone	Status
Investigate households within the CBCA that are indicated as being on OSDS to determine the correctness of the designation	On-going with coordination between EPS – Groundwater Section and staff from the Metropolitan District
Investigate households within the URDL that are indicated as being on OSDS to determine the correctness of the designation	On-going with coordination between EPS – Groundwater Section and staff from the Metropolitan District
Investigate the legal mechanisms for requiring households on OSDS within the URDL to connect to the sanitary sewer system	Complete
Develop outreach and education programs on the value of OSDS pump-outs with the intention of increasing the pump-out rate from 21.5% to 33.3% or once every three years on average	Complete
Investigate solutions for OSDS problem areas identified in the report entitled <i>Problem Areas for OSDS in Baltimore County</i> (DEPRM 1998)	Not Initiated yet
Improve tracking of OSDS connections to the sanitary sewer and OSDS pump-outs	Various means of tracking OSDS connections to the sanitary sewer are being explored. A tracking system for OSDS pump-outs has been developed.
Conduct detailed parcel analysis between data used in MDE Report and Baltimore County data	Complete

9.6.2.2 Pollutant Load Reductions for Meeting the Chesapeake BayTMDL

The above section only accounts for restoration actions taken during the time period of January 1, 2011 through June 30, 2013. In order to account for past restoration actions and the installation of stormwater BMPs, an analysis based on the 2010 land use nutrient and sediment pollutant loading was conducted.

Tables 9-57, 9-58, and 9-59 present the edge-of-stream loads for nitrogen, phosphorus, and sediment; respectively based on the Chesapeake Bay Watershed Model run of July 2011 and incorporated into MAST in October 2011. The loads are expressed by both watershed and source. For the urban sector all of the urban loads are included, even those that are the responsibility of the State and Federal governments.

Table 9-57: Edge-of-Stream Nitrogen Loads by Source and Watersheds Based on the Chesapeake Bay Watershed Model

Watershed	Urban	Septic	Point Sources	Agriculture	Total
Upper Western Shore					
Deer Creek	10,096	3,456	0	55,859	69,411
Prettyboy	28,934	11,278	0	141,455	181,667
Loch Raven	423,479	113,348	1,823	644,884	1,183,534
Lower Gunpowder	157,941	42,586	4,572	102,560	307,659
Little Gunpowder	48,884	18,399	0	90,052	157,335
Bird River	86,214	23,618	42	11,316	121,190
Gunpowder River	13,136	11,112	89,772	3,521	117,541
Middle River	35,749	14,492	128,167	1,958	180,366
Total UWS	804,433	238,289	224,376	1,051,605	2,318,703
Patapsco/Back River					
Liberty	35,516	13,822	6	67,695	117,039
Patapsco	214,981	26,523	2,922	60,654	305,080
Gwynns Falls	317,902	50,716	1,261	15,949	385,828

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Jones Falls	183,427	33,025	156	30,931	247,539
Back River	148,108	6,915	570,120	1,824	726,967
Baltimore Harbor	74,983	16	703,491	1,773	780,263
Total P/B	974,917	131,017	1,277,956	178,826	2,562,716
<i>Baltimore County Total</i>	<i>1,779,350</i>	<i>369,306</i>	<i>1,502,332</i>	<i>1,230,431</i>	<i>4,881,419</i>
<i>%</i>	<i>34.5%</i>	<i>7.2%</i>	<i>29.1%</i>	<i>23.8%</i>	

Table 9-58: Edge-of-Stream Phosphorus Loads by Source and Watersheds Based on the Chesapeake By Watershed Model

Watershed	Urban	Point Sources	Agriculture	Total
Upper Western Shore				
Deer Creek	469	0	3,408	3,877
Prettyboy	1,389	0	8,629	10,018
Loch Raven	20,926	74	39,341	60,341
Lower Gunpowder	8,059	806	6,257	15,122
Little Gunpowder	2,083	0	5,494	7,577
Bird River	8,462	10	743	9,215
Gunpowder River	1,414	3,013	231	4,658
Middle River	3,372	2,537	129	6,038
Total UWS	46,174	6,440	64,232	116,846
Patapsco/Back River				
Liberty	1,741	2	4,135	5,878
Patapsco	11,640	145	3,705	15,490
Gwynns Falls	16,980	445	974	18,399
Jones Falls	9,734	7	1,889	11,630
Back River	14,566	28,651	120	43,337
Baltimore Harbor	7,922	59,671	117	67,710
Total P/B	62,583	88,921	10,940	162,444
<i>Baltimore County Total</i>	<i>108,757</i>	<i>95,361</i>	<i>75,172</i>	<i>279,209</i>
<i>%</i>	<i>38.9%</i>	<i>34.1%</i>	<i>26.9%</i>	

Table 9-59: Edge-of-Stream Sediment Loads by Source and Watersheds Based on the Chesapeake By Watershed Model

Watershed	Urban	Point Sources	Agriculture	Total
Upper Western Shore				
Deer Creek	632,024	0	3,381,429	4,013,453
Prettyboy	1,559,700	91	6,013,004	7,572,795
Loch Raven	21,050,277	100,272	30,235,572	51,386,121
Lower Gunpowder	10,122,090	9,547	4,516,816	14,648,453
Little Gunpowder	2,618,437	0	5,850,467	8,468,904
Bird River	3,666,969	307	211,615	3,878,891
Gunpowder River	659,251	141,960	79,815	881,026
Middle River	1,520,529	479,164	51,675	2,051,368
Total UWS	41,829,277	731,341	50,340,393	92,901,011
Patapsco/Back River				
Liberty	1,903,235	23	3,312,154	5,215,412
Patapsco	14,227,700	32,182	3,187,546	17,447,428
Gwynns Falls	22,607,264	4,425	951,975	23,563,664
Jones Falls	5,793,631	1,107	707,342	6,502,080
Back River	5,277,382	4,273,995	47,717	9,599,094
Baltimore Harbor	3,439,025	4,213,283	52,535	7,704,843
Total P/B	53,248,237	8,525,015	8,259,269	70,032,521
<i>Baltimore County Total</i>	<i>95,077,514</i>	<i>9,256,356</i>	<i>58,599,662</i>	<i>162,933,532</i>
<i>%</i>	<i>56.6%</i>	<i>5.5%</i>	<i>34.9%</i>	

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The Chesapeake Bay TMDL is based on delivered loads to the bay. Depending on distance from the bay and intervening water bodies, there are different delivery ratios from Baltimore County watersheds to the Bay. The delivery ratios are derived from MAST data, and where there are multiple land/river segments with differing delivery ratios within a watershed a weighted mean delivery ratio is used. Similarly, restoration efforts will be differentially credited depending on location. Tables 9-60, 9-61, and 9-62 display the delivered load to the Chesapeake Bay by watershed for nitrogen, phosphorus, and sediment, respectively.

Table 9-60: Delivered Nitrogen Loads by Source and Watersheds Based on the Chesapeake By Watershed Model

Watershed	Delivery Ratio	Urban	Septic	Point Sources	Agriculture	Total
Upper Western Shore						
Deer Creek	57.4%	5,795	1,984	0	32,063	39,842
Prettyboy	5.5%	1,591	620	0	7,780	9,992
Loch Raven	25.9%	109,681	29,357	472	167,025	306,535
Lower Gunpowder	88.8%	140,252	37,816	4,060	91,073	273,201
Little Gunpowder	70.8%	34,610	13,026	0	63,757	111,393
Bird River	87.5%	75,437	20,666	37	9,902	106,042
Gunpowder River	100.0%	13,136	11,112	89,772	3,521	117,541
Middle River	100.0%	35,749	14,492	128,167	1,958	180,366
Total UWS		416,251	129,073	222,508	377,079	1,144,911
Patapsco/Back River						
Liberty	0.0%	0	0	0	0	0
Patapsco	53.2%	114,370	14,110	1,555	32,268	162,303
Gwynns Falls	33.7%	107,133	17,091	425	5,375	130,024
Jones Falls	18.6%	34,117	6,143	29	5,753	46,042
Back River	96.2%	142,480	6,652	548,455	1,755	699,342
Baltimore Harbor	100.0%	74,983	16	703,491	1,773	780,264
Total P/B		473,083	44,012	1,253,955	46,924	1,817,975
Baltimore County Total		889,344	173,085	1,476,463	424,0031	2,962,888
		30.0%	5.8%	49.8%	14.3%	

Table 9-61: Delivered Phosphorus Loads by Source and Watersheds Based on the Chesapeake By Watershed Model

Watershed	Delivery Ratio	Urban	Point Sources	Agriculture	Total
Upper Western Shore					
Deer Creek	75.5%	354	0	2,573	2,927
Prettyboy	8.1%	113	0	699	812
Loch Raven	36.0%	7,533	27	14,163	21,723
Lower Gunpowder	79.4%	6,399	640	4,968	12,007
Little Gunpowder	83.6%	1,741	0	4,593	6,334
Bird River	94.6%	8,005	9	703	8,717
Gunpowder River	100.0%	1,414	3,013	231	4,659
Middle River	100.0%	3,372	2,537	129	6,039
Total UWS		28,931	6,226	28,059	63,216
Patapsco/Back River					
Liberty	0.0%	0	0	0	0
Patapsco	27.1%	3,154	39	1,004	4,197
Gwynns Falls	66.7%	11,326	297	650	12,273
Jones Falls	22.5%	2,190	2	425	2,617
Back River	98.4%	14,333	28,193	118	42,644
Baltimore Harbor	100.0%	7,922	59,671	117	67,711

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Total P/B		38,925	88,202	2,314	129,441
<i>Baltimore County Total</i>		<i>67,586</i>	<i>94,428</i>	<i>30,373</i>	<i>192,657</i>
%		33.6%	49.0%	15.7%	

Table 9-62: Delivered Sediment Loads by Source and Watersheds Based on the Chesapeake By Watershed Model

Watershed	Delivery Ratio	Urban	Point Sources	Agriculture	Total
Upper Western Shore					
Deer Creek	79.6%	503,091	0	2,691,617	3,194,709
Prettyboy	0.4%	6,239	0	24,052	30,291
Loch Raven	22.5%	4,736,312	22,561	6,803,004	11,561,877
Lower Gunpowder	66.0%	6,680,597	6,301	2,981,099	9,667,979
Little Gunpowder	106.3%	2,783,399	0	6,219,046	5,337,354
Bird River	137.6%	5,045,749	422	291,182	5,337,354
Gunpowder River	100.0%	659,251	141,960	79,815	881,027
Middle River	100.0%	1,520,529	479,164	51,675	2,051,369
Total UWS		18,572,199	324,715	22,351,134	41,248,049
Patapsco/Back River					
Liberty	0.0%	0	0	0	0
Patapsco	47.3%	6,729,702	15,222	1,507,709	8,252,633
Gwynns Falls	102.6%	23,195,053	4,540	1,507,709	41,248,049
Jones Falls	79.4%	4,600,143	879	561,360	5,162,652
Back River	112.0%	5,910,668	4,786,874	53,443	10,750,985
Baltimore Harbor	100.0%	3,439,025	4,213,283	52,535	7,704,844
Total P/B		41,959,611	6,717,712	6,508,304	55,185,627
<i>Baltimore County Total</i>		<i>55,905,578</i>	<i>5,442,737</i>	<i>34,456,601</i>	<i>95,804,917</i>
%		58.4%	5.7%	36.0%	

The amount of pollutant reduction of the urban stormwater load due to installation of stormwater Best Management Practices and restoration efforts is displayed in Table 9-63, 9-64, and 9-65 for nitrogen, phosphorus, and sediment, respectively. These tables also show the edge-of-stream load reductions, the delivered load reductions, the percentage of load reduction and the remaining load. These tables do not account for State and Federal actions. In the next annual urban stormwater loads will be broken out by county responsibility versus State and Federal responsibility.

Table 9-63: Urban Stormwater Edge-of-Stream and Delivered Load - Nitrogen Reduction by Watersheds

Watershed	Edge-of-Stream Loads			Delivery Ratio	Delivered Loads			
	SWM Reductions	Restoration Reductions	Total Reductions		Load Reduction	Urban Stormwater Load	% Reduction	Remaining Load
Upper Western Shore								
Deer Creek	0	0.4	0.4	57.4%	0.2	5,795	0.0%	5,795
Prettyboy	363	330.7	693.7	5.5%	38.2	1,591	2.4%	1,553
Loch Raven	14,664	7,151.7	21,816	25.9%	5,650.3	109,681	5.2%	104,031
Lower Gunpowder	4,987	5,739.7	10,727	88.8%	9,525.3	140,252	6.8%	130,727
Little Gunpowder	1,866	33.6	1,900	70.8%	1,344.9	34,610	3.9%	33,265
Bird River	5,438	1,080.1	6,518	87.5%	5,703.3	75,437	7.6%	69,734
Gunpowder River	320	188.7	509	100.0%	508.7	13,136	3.9%	12,627
Middle River	837	2,756.6	3,594	100.0%	3,593.6	35,749	10.1%	32,155
Total UWS	28,475	17,281.5	47,757		26,364.5	416,251	6.8%	389,886

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Patapsco/Back River								
Liberty	1,091	15.9	1,107	0.0%	0	0	NA	0
Patapsco	9,052	1,574.7	10,627	53.2%	5,653.4	114,370	4.9%	108,717
Gwynns Falls	15,675	2,537.9	18,213	33.7%	6,137.8	107,133	5.7%	100,995
Jones Falls	7,955	2,765.7	10,721	18.6%	1,994.1	34,117	5.8%	32,123
Back River	3,387	7,560.0	10,947	96.2%	10,531.0	142,480	7.4%	131,949
Baltimore Harbor	572	2,361.2	2,933	100.0%	2,933.2	74,983	3.9%	72,050
Total P/B	37,732	16,815.4	54,547		27,249.4	473,083	5.8%	444,837
Baltimore County Total	66,207	34,097	100,304		53,614	889,344	6.0%	835,720

Table 9-64: Urban Stormwater Edge-of-Stream and Delivered Load - Phosphorus Reduction by Watersheds

Watershed	Edge-of-Stream Loads			Delivery Ratio	Delivered Loads			
	SWM Reductions	Restoration Reductions	Total Reductions		Load Reduction	Urban Stormwater Load	% Reduction	Remaining Load
Upper Western Shore								
Deer Creek	0	0	0	75.5%	0	354	0.0%	354
Prettyboy	27	7	34	8.1%	3	113	2.4%	110
Loch Raven	1,064	1,624	2,688	36.0%	968	7,533	12.8%	6,565
Lower Gunpowder	355	1,302	1,657	79.4%	1,316	6,399	20.6%	5,083
Little Gunpowder	103	0	103	83.6%	86	1,741	4.9%	1,655
Bird River	693	1,858	2,551	94.6%	2,413	8,005	30.1%	5,592
Gunpowder River	34	32	66	100.0%	66	1,414	4.7%	1,348
Middle River	101	1,509	1,610	100.0%	1,610	3,372	47.7%	1,762
Total UWS	2,376	6,332	8,709		6,461	28,931	22.3%	22,471
Patapsco/Back River								
Liberty	63	0	63	0.0%	0	0	NA	0
Patapsco	820	249	1,069	27.1%	209	3,154	9.2%	2,864
Gwynns Falls	1,666	222	1,888	66.7%	1,259	11,326	11.1%	10,067
Jones Falls	660	616	1,276	22.5%	287	2,190	13.1%	1,903
Back River	518	2,444	2,962	98.4%	2,915	14,333	20.3%	11,418
Baltimore Harbor	118	737	855	100.0%	855	7,922	10.8%	7,067
Total P/B	3,845	4,268	8,113		5,606	38,925	14.4%	33,319
Baltimore County Total	6,221	10,600	16,822		12,067	67,856	17.8%	55,789

Table 9-65: Urban Stormwater Edge-of-Stream and Delivered Load - Sediment Reduction by Watersheds

Watershed	Edge-of-Stream Loads			Delivery Ratio	Delivered Loads			
	SWM Reductions	Restoration Reductions	Total Reductions		Load Reduction	Urban Stormwater Load	% Reduction	Remaining Load
Upper Western Shore								
Deer Creek	0	0	0	79.6%	0	503,091	0.0%	503,091
Prettyboy	48,640	8,735	57,375	0.4%	230	6,239	3.7%	6,010
Loch Raven	1,606,740	7,295,122	8,901,862	22.5%	2,002,919	4,736,312	42.3%	2,733,393
Lower Gunpowder	683,900	6,056,700	6,740,600	66.0%	4,448,796	6,680,597	66.6%	2,231,801
Little Gunpowder	179,820	0	179,820	106.3%	179,820	2,783,399	6.5%	2,603,579
Bird River	435,480	8,113,094	8,548,574	137.6%	8,548,574	5,045,749	169.4%	-3,502,825
Gunpowder River	25,280	87,671	112,951	100.0%	112,951	659,251	17.1%	546,300

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Middle River	64,520	6,133,227	6,197,747	100.0%	6,197,747	1,520,529	407.6%	-4,677,218
Total UWS	3,044,380	27,694,549	30,738,929		21,491,036	21,935,167	98.0%	444,131
Patapsco/Back River								
Liberty	116,820	0	116,820	0.0%	0	0	NA	0
Patapsco	1,422,140	1,380,537	2,802,677	47.3%	1,325,666	6,729,702	19.7%	5,404,036
Gwynns Falls	4,033,100	1,536,961	5,570,061	102.6%	5,570,061	23,195,053	24.0%	17,624,992
Jones Falls	647,260	3,271,076	3,918,336	79.4%	3,111,159	4,600,143	67.6%	1,488,984
Back River	388,240	11,734,796	12,123,036	112.0%	12,123,036	5,910,668	205.1%	-6,212,368
Baltimore Harbor	75,800	3,823,000	3,898,800	100.0%	3,898,800	3,439,025	113.4%	-459,755
Total P/B	6,683,360	21,746,370	28,429,730		26,028,722	41,959,611	62.0%	17,845,569
Baltimore County Total	9,727,740	27,879,597	59,168,659		47,519,758	63,450,647	74.9%	18,290,000

As can be seen from the above table only 6.4% nitrogen and 17.8% phosphorus has been reduced for the urban stormwater load. Nitrogen removal from the various stormwater BMPs and restoration activities is usually less efficient than phosphorus removal. Therefore, making the nitrogen reduction target for urban stormwater will be more difficult to achieve. For sediment the reduction is considerably high with a 74.9% reduction and in some watersheds a negative remaining load is calculated. This indicates that there is an issue with the modeling of sediment in the CBP Watershed Model.

Appendix II

Baltimore County Office of Budget and Finance Stormwater Report In accordance with Article 34-4-105(A)

Baltimore County Office of Budget and Finance
Stormwater Report
In Accordance with Article 34-4-105(A)

Section I: FY 2014 Properties by Class

Residential - Condo	19,952	
Residential - SFA	65,405	
Residential - SFD	155,710	
Commerical - with fee > than \$0	12,945	
Institutional with fee > than \$0	1,384	
Commercial with fee = \$0	1,682	(*)
Institutional with fee = \$0	352	(*)
	<hr/> 257,430	
Exempt and Residential Vacant prop.	39,560	(**)

(*): Commercial and Institutional accounts which are vacant and hence fee is \$0

(**):	Residential, Unimproved	24,190	
	Agricultural	1,786	
	Exempt (COMAR Chapter		
	151 State & Local Gov't	<hr/> 13,584	
		39,560	

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Section II: Revenues by Source

Cash Collections	\$ 24,670,197.72 (*)
Metro Funds Made Available	\$ 10,000,000.00
Estimated Interest	<u>\$ 36,597.03 (*)</u>
Total	<u><u>\$ 34,706,794.75</u></u>

(*) Amounts collected per OBF through 6/30/14.

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In Accordance with Article 34-4-105(A)

Section III: Operating Encumb. & Expenditures as of Category 6/30/14

	Encum & Exp. 6/30/14	% of SWM Funds
<u>Capital Improvements:</u>		
(*) \$	339,712	0.98%
<u>Operation & Maintenance of Stormwater Management Systems & Facilities:</u>		
(A) \$	187,008	0.54%
<u>Public Education:</u>		
(A) \$	53,583	0.15%
<u>Stormwater Management & Planning:</u>		
(A) \$	53,583	0.15%
<u>Fund on Deposit for Review of plans and permits:</u>		
\$	-	0.00%
<u>Grants to Non-Profits:</u>		
\$	-	0.00%
<u>Reasonable Costs for Administration:</u>		
(B) \$	572,822	1.65%
Stormwater Fee	(*) <u>\$ 1,206,708</u>	3.48%

(*): Amount represents direct program delivery costs from EPS to administer the Stormwater Remediation efforts. Indirect costs provided by EPS & other agencies (e.g., DPW, OBF, etc.) are not included.

(A): Salary & Fringe

(B): Costs include:

Renovations of Facilities	\$ 323,682
Operational Supplies, Equip., DP Equip., furnishings & Svcs.	\$ 212,528
Vehicles & Mileage	\$ 31,471
Training	\$ 5,141
	<u>\$ 572,822</u>

Baltimore County Office of Budget and Finance
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Section IV: Capital Related Encum. & Expenditures by Category as of 6/30/14

	Alotted	% of SWM Funds
<u>Capitla Improvements:</u>		
Capital Improvement Program	\$ 17,324,309	49.92%
Metro Fund	<u>\$ 7,625,382</u>	21.97%
	\$ 24,949,691	71.89%

Operation & Maintenance of Stormwater Management Systems & Facilities:

Capital Improvement Program	\$ 4,472,072	12.89%
Metro	<u>\$ -</u>	0.00%
	\$ 4,472,072	12.89%

Public Education:

Capital Improvement Program	\$ -	0.00%
Metro	<u>\$ -</u>	0.00%
	\$ -	0.00%

Stormwater Management & Planning:

Capital Improvement Program	\$ 1,276,873	3.68%
Metro	<u>\$ -</u>	0.00%
	\$ 1,276,873	3.68%

Fund on Deposit for Review of plans and permits:

Capital Improvement Program	\$ -	0.00%
Metro	<u>\$ -</u>	0.00%
	\$ -	0.00%

Grants to Non-Profits:

Capital Improvement Program	\$ 315,604	0.91%
Metro	<u>\$ -</u>	0.00%
	\$ 315,604	0.91%

Reasonable Costs for Administration:

Capital Improvement Program	\$ -	0.00%
Metro	<u>\$ -</u>	0.00%
	\$ -	0.00%

Total by category

Capital Improvement Program	\$ 23,388,858	67.39%
Metropolitan District Funding	<u>\$ 7,625,382</u>	21.97%
Total	<u>\$ 31,014,240</u>	90.81%

Baltimore County Office of Budget and Finance
Stormwater Report
In Accordance with 34-4-105(A)

Section V: Councilmanic Breakdown of Encumbrances & Expenditures as of 6/30/14 in detail

Council District										% of Fund
1	2	3	4	5	6	7	All(*)	Total		
	\$ 122,766							\$ 122,766	0.35%	
							\$ 300,000	\$ 300,000	0.86%	
\$ 10,764								\$ 10,764	0.03%	
\$ 33,029								\$ 33,029	0.10%	
					\$ 99,602			\$ 99,602	0.29%	
\$ 133,562								\$ 133,562	0.38%	
					\$ 183,467			\$ 183,467	0.53%	
						\$ 83,793		\$ 83,793	0.24%	
		\$ 73,583						\$ 73,583	0.21%	
		\$ 31,745						\$ 31,745	0.09%	
			\$ 158,852					\$ 158,852	0.46%	
		\$ 137,627						\$ 137,627	0.40%	
\$ 288,126								\$ 288,126	0.83%	
		\$ 41,041						\$ 41,041	0.12%	
			\$ 254,055					\$ 254,055	0.73%	
		\$ 138,189						\$ 138,189	0.40%	
		\$ 145,854						\$ 145,854	0.42%	
		\$ 140,593						\$ 140,593	0.41%	
					\$ 70,721			\$ 70,721	0.20%	
					\$ 364,392			\$ 364,392	1.05%	
						\$ 294,509		\$ 294,509	0.85%	
						\$ 243,377		\$ 243,377	0.70%	
						\$ 61,450		\$ 61,450	0.18%	
		\$ 43,745						\$ 43,745	0.13%	
					\$ 61,752			\$ 61,752	0.18%	
								\$ 14,097	0.04%	
		\$ 14,097						\$ 15,022	0.04%	
		\$ 15,022				\$ 10,589		\$ 10,589	0.03%	
								\$ 10,162	0.03%	
\$ 10,162								\$ 6,378	0.02%	
					\$ 6,378			\$ 6,378	0.02%	
		\$ 15,171						\$ 15,171	0.04%	
			\$ 17,681	\$ 4,805				\$ 17,681	0.05%	
					\$ 278,584			\$ 4,805	0.01%	
								\$ 278,584	0.80%	
		\$ 134,972						\$ 134,972	0.39%	
			\$ 137,787					\$ 137,787	0.40%	
		\$ 132,436						\$ 132,436	0.38%	
					\$ 14,430,436			\$ 14,430,436	41.58%	
		\$ 387,724						\$ 387,724	1.12%	
\$ 297,121								\$ 297,121	0.86%	
\$ 56,897								\$ 56,897	0.16%	
\$ 335,917								\$ 335,917	0.97%	
							\$ 86,000	\$ 86,000	0.25%	
							\$ 8,202	\$ 8,202	0.02%	
		\$ 2,953						\$ 2,953	0.01%	
		\$ 18,890						\$ 18,890	0.05%	
					\$ 72,630			\$ 72,630	0.21%	

[illegible]

Baltimore County Office of Budget and Finance
Stormwater Report
In Accordance with 34-4-105(A)

Section V: Councilmanic Breakdown of Encumbrances & Expenditures as of 6/30/14 in detail

	Council District										
	1	2	3	4	5	6	7	All(*)	Total	% of Fund	
Friends of Patapsco Grant	\$ 18,750			\$ 18,750					\$ 37,500	0.11%	
Dundalk Renaissance Corp Grant							\$ 37,500		\$ 37,500	0.11%	
									\$ 315,604	0.91%	
Total											
Reasonable Costs for Administration											
EPS Stormwater Remediation Program								\$ 1,206,708	\$ 1,206,708	3.48%	
TOTAL	\$ 1,450,535	\$ 662,911	\$ 4,071,711	\$ 2,073,406	\$ 943,343	\$ 16,060,496	\$ 1,352,382	\$ 5,606,164	\$ 32,220,948	92.84%	

(*) : Represents funds for personnel, program administration, and activities that could be applied to projects in any Council District (e.g., street sweeping, Grants to non-profits, public education, etc.)